THE GLANDS *of* LIFE

FRANK R. STARKEY, M.D.

22.B.191.

ERRATA

Page 39, for *inbibition* read *imbibition.* 85, *occur* read *occurs.* 101, *anaemic* read *anemic.* 127, *mvdriatic* read *mydriatic.* 166, *gaind* read *gained.* 166, *delibity* read *debility.* 200, *becomes* read *become.* 208, *trachia* read *trachea.* 221, *vitate* read *vitae.* 228, *occur* read *would occur.* 231, *is* read *are.*

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THE GLANDS OF LIFE

The author in 1914; note more youthful, vigorous and healthy appearance.

CAT.

THE GLANDS OF LIFE

A CONTRIBUTION TO THE STUDY OF ORGANOTHERAPY

By
FRANK R. STARKEY, M.D.,
Fellow of the American Medical Association, etc.

ILLUSTRATED WITH PHOTOGRAPHS AND ANATOMICAL PLATES

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PREFACE

The human body, the most complex of organisms, surpasses all others in the development of the cerebrospinal axis, culminating in the convolutions of the brain, whose functions constitute the psychic processes denominated mentality.

This highly specialized nervous system and the subordinate muscular mechanism depend for maintenance upon nutrient substances elaborated by the visceral organs, sometimes called the organs of vegetative life, whose functions are performed involuntarily and unconsciously.

It is well understood that the activities of these visceral organs are regulated by impulses proceeding from centers of nerve force; but underlying these activities there must be some primal, sustaining force, upon which they depend, a force most intimately associated with the essential phenomena of life. It is now believed that this force emanates from a group of organs known as "the ductless glands" and hence these are termed "The Glands of Life."

This supremely important, life-sustaining force is inherent in fluids, called internal secretions, elaborated by certain cells within the tissue of the glands. These secretions mingle with the stream circulating through the blood vessels and thus come in contact with the organs which it is their function to vitalize, by transferring to them the force of which they act as carriers.

It is the purpose of this thesis to explain, in the light of recent scientific progress, the physiological role played by the glands of life, from which this force emanates, and also to show that serious diseases are caused by any alteration in the natural supply of this force, and that cures may be effected by furnishing this force, as therapeutic treatment.

Methods designed to accomplish such results are called "Organotherapy." In crude forms this kind of treatment has long had a place in domestic, or household, medicine. At the present time it is exciting great interest in the medical profession. Its essential feature is to imitate as closely as possible the internal secretions of the glands of life, by making extracts from the corresponding glands in healthy vigorous animals and then injecting these extracts, so as to bring them in contact with the human organs to be affected, in ways as similar as possible to the normal processes of the healthy body.

The technique of this method has now been developed to a point where the imitation of nature is very close and the debilitated organ is restored by the action of the same vitalizing force, upon which its physiological function depended. As thus practiced, Organotherapy appeals to reason and to common sense. The clinical evidence in its support is already so convincing, that we are justified in the belief that it is destined to occupy a most important place in the science and art of therapeutics.

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CHAPTER I.

HISTORY OF THE DUCTLESS GLANDS.

The glands first recognized by the ancient anatomists, who studied the human body, were those large organs producing liquids, which were carried away in tubes called ducts. The liver on account of its great size, its peculiar color and the striking characteristics of the fluid it produced, the bile, attracted extraordinary attention and it was supposed to exert great psychic as well as physiologic influence.

With the gradual increase of anatomical knowledge, the name gland was applied to certain other organs whose structure was similar, although they were not supplied with ducts and showed no mechanism for taking in or sending out substances, except the blood vessels, by which they were traversed. By way of distinction these organs were called "the ductless glands." They are seven in number: the pituitary and the pineal located in the brain; the thymus directly behind the top of the breast bone; the thyroid just above the thymus; the spleen interposed between the left end of the stomach and the abdominal wall, and the two suprarenal capsules, placed in front of the upper margin of the kidneys.

The name, ductless glands, is not a wholly satisfactory one. It merely indicates that these bodies are glands distinguished from others by the negative characteristic of lacking ducts. More than fifty years ago, Dr. William B. Carpenter, then the leading physiologist of England, proposed the appellation "vascular glands," as indicating some relation between these organs and the process of blood making (Sanguification in Carpenter's Principles of Human Physiology, Philadelphia, 1860, page 159). This term did not come into general use; but the fact that it was proposed shows that in the middle of the last century it was thought that these organs had some important function. This opinion has been confirmed and more than confirmed by recent researches. Scientists now know that these glands exert a subtle, but powerful, influence upon the two groups of functions having the greatest importance; those which sustain life, and those which reproduce life. In the author's judgment their connection with the most intimate and essential phenomena of vitality justifies giving to them the name, which stands as the title of this thesis; *the glands of life.*

In the parenchyma of these glands (and a few others) there are cells filled with a colloid substance, which produces a liquid called an internal secretion. The internal secretion of each gland contains the active principle or principles of that particular gland and is endowed with the gland's potency; hence these internal secretions are continually mentioned in discussions of this subject and they should be designated by a distinctive name, a name applied to them and to nothing else.

The words "internal secretions" have too wide a scope and might signify substances quite beyond the boundaries of this group.

To meet the requirements of scientific nomenclature, the name adopted should express the most important quality or characteristic of the thing named and its signification should be plainly indicated by the word's derivation. Prof. E. H. Starling of University College, London, suggested the term hormones, derived from the Greek verb, *ʽορμάω*, meaning to excite or stimulate. He was impressed by the power of these secretions to stimulate the activities of the visceral organs and he wished to express that fact in the name.*

Stimulation is certainly one of the roles played by these fluids; but they take a still more important part in the organism. Their composition is very complex: they represent many active principles, or potencies. These sometimes act conjointly, sometimes in a substitutionary way, so that if one of them is in abeyance, another takes its place; sometimes they reinforce each other; sometimes they antagonize each other; but all these complex actions, reactions and interactions conspire to establish that equilibrium, that delicately adjusted balance of

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*Several English and American writers, adopting Professor Starling's idea, have used the term, *hormones,* which is not formed in accordance with the analogy of descriptive nouns derived from Greek verbs. The usual etymological method would give in the singular, *hormon* and in the plural, *hormonta.* An anglicised plural form in two syllables, *hormons,* might be allowed; but the unnecessary *e* before the final letter obscures the derivation.

forces, which not only regulates the operation of some single organ, or some group of organs; but is essential to the maintenance of life itself. To establish and sustain this equilibrium is the supreme function of these internal secretions and this should be clearly indicated in the name by which they are known. The word, *Ergonisons,* expresses this idea. It is derived from the Greek noun, ’έργον, meaning function or work, and the verb ’ίσοω, signifying to equalize. An ergonison is that which equalizes function, which sustains balance, and the term plainly designates what is the most important activity of these secretions of the glands of life.

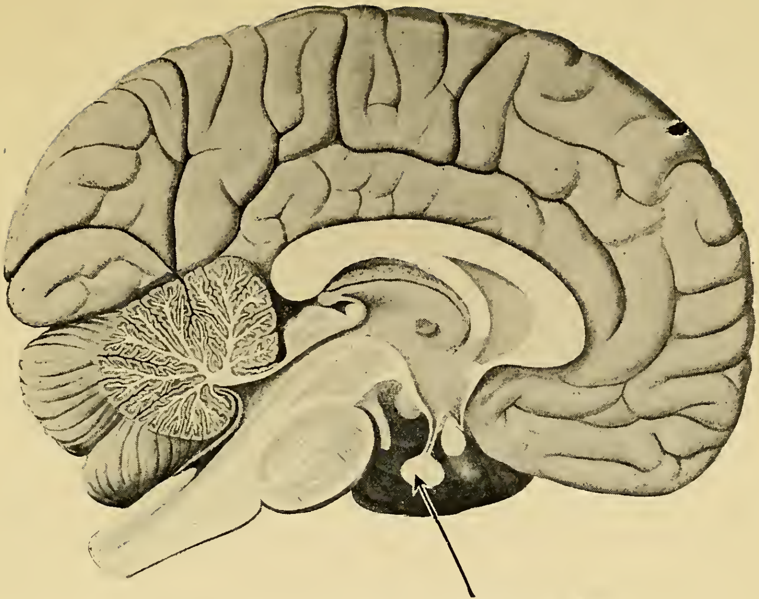
The latter part of the nineteenth century witnessed a revolution in the science of medicine due to the universal acceptance of the germ theory of disease. The pioneer discoverers were Lord Lister of Edinburgh, who demonstrated its truth in the province of surgery, and Dr. Robert Koch of Berlin, who extended the demonstration to cover the zymotic or infectious diseases. Their work led to a re-examination of the entire subject of etiology and associated branches. The functions of organs were reinvestigated from a new point of view and, among the changes, were important new ideas regarding the glandular system, which was seen to have activities not previously recognized.

Brown-Sequard of Paris prepared from bovine testes an extract, which he administered to his students and to himself. His report upon its rejuvenating influence, not only upon the sexual system but upon the vital functions generally, attracted world-wide attention and awakened great enthusiasm. Many seemed to think that the elixir of life had at last been produced and the fountain of youth actually discovered. These extravagant hopes were disappointed; but aside from all exaggerations, this testicular extract had real medicinal value as a tonic and stimulant. It was soon proved that this value did not depend upon the spermatozoa or the seminal plasma; for preparations made from them were inert; and the fact came to be recognized that the potency of the extract was due to an internal secretion of the testes and to this the name spermin was applied.

Brown-Sequard's discovery encouraged others to search for internal secretions in various organs, especially the thyroid, the pituitary and other ductless glands, whose functions had not previously been understood. Such investigations were pursued by Ord and Gull in England; by Renon in France and by Schäfer and his colleagues in Germany. The subject gradually attracted attention in America. In 1903, Dr. Charles E. deM. Sajous of Philadelphia published a long treatise upon "The Internal Secretions" and a second bulky volume was issued five years later. Prof. S. P. Beebe of the Medical School of Cornell University made researches upon the influence of iodine as a constituent of these secretions, particularly that produced by the thyroid gland. Prof. William S. Halstead of Johns Hopkins

University pursued studies of alterations taking place in the glands, after one of the group has been removed, utilizing the results of his surgical clinics and also making observations upon human cadavers; to be compared with the data drawn from animal experimentation. Prof. Cushing of Harvard University has made many investigations bearing upon the general subject.

Other investigators are referred to in the subsequent chapters of this thesis. Indeed at the present time many able men, both in this country and abroad, are sedulously working in this field and it is to be hoped that in the near future our knowledge of the subject may attain that clarity and certitude which its great importance demands.



Median section of the brain showing pituitary body.

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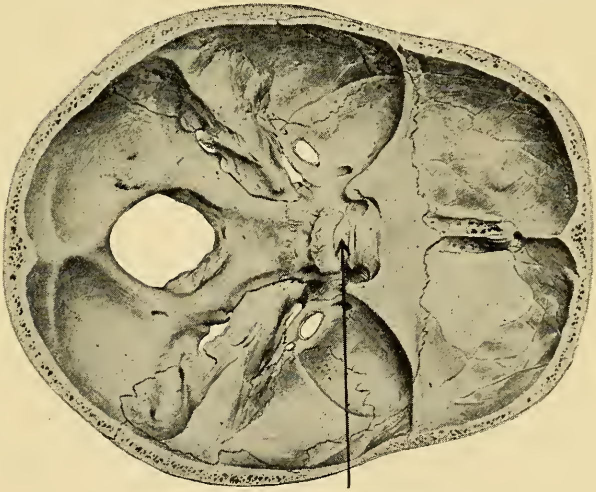

Base of skull showing sella turcica.

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CHAPTER II.

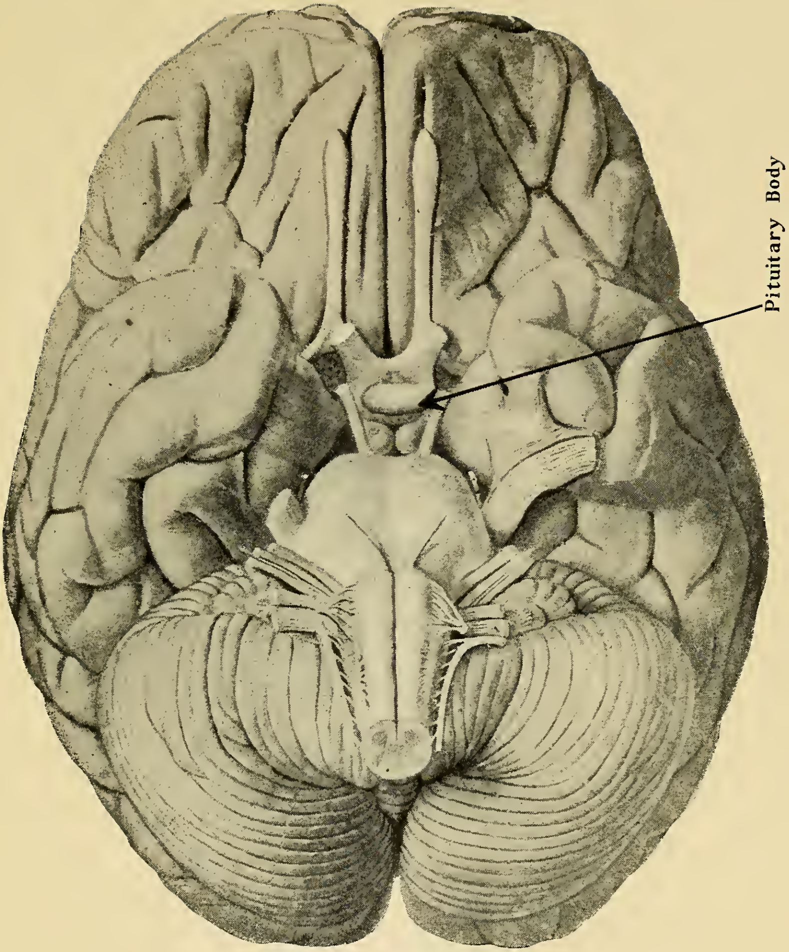
ANATOMY AND HISTOLOGY.

Of the two ductless glands located in the brain, the larger is the *pituitary.* It lies in a depression of the sphenoid bone called from its shape the Turkish saddle (sella turcica) and is covered by the dura mater, the membrane enveloping the brain. It is oval in form, reddish gray in color and weighs from five to ten grains. It consists of two lobes, which are connected by an isthmus. The anterior lobe is oblong and of a lighter color than the posterior and smaller lobe, which is dark in hue and spherical in shape. The isthmus is fibrous in character; but the lobes consist of glandular tissue traversed by many blood vessels with the interspaces filled by cells of a peculiar kind. These cells contain a colloid substance of complex composition and in them are elaborated the liquids called internal secretions, or ergonisons, which pass through the vessel walls and thus become mingled with the plasma of the blood. No chemical distinction has been shown between the ergonisons produced by the anterior and posterior lobes; but they appear to differ in the influences they exert upon the organism.

The pineal gland placed a little further back is a small body shaped like a pine tree cone, from which (pinus) it derives its name. It is of a reddish gray color and is extremely vascular; a mesh of blood vessels; between which there is a stroma of gray matter and granular cells. In its center there is a small cavity containing a transparent viscid fluid and frequently, in addition, a sort of fine sand (sabulum), which has been shown to consist of phosphate and carbonate of lime, phosphate of magnesia and some other salts, which enter into the composition of bone. Why these bone salts are here, hidden away among soft nerve tissue at the base of the brain, is a mystery as yet unsolved. Like the pituitary, the pineal can send its ergonison to other parts of the body only by the pathway of the blood.

The thymus gland lies behind the breastbone (sternum) near the junction of the throat and chest. It consists of a right and a left lobe, one on each side of the median line; but sometimes these coalesce into a single lobe. Its color is pink, its length about two inches and its weight from half an ounce to an ounce. These are the dimensions of the organ at its period of full development, which is reached at the end of the second year of life. The thymus is a relatively conspicuous organ during the prenatal period and it continues to grow after birth; but with the termination of infancy it begins to decrease in size and continues to dwindle slowly until the age of puberty, when it has nearly disappeared. After that the only vestige remaining is a transverse fibrous band; or sometimes a fibrous pouch containing adipose cells.

The thymus lobes are themselves composed of



Base of brain showing pituitary body.

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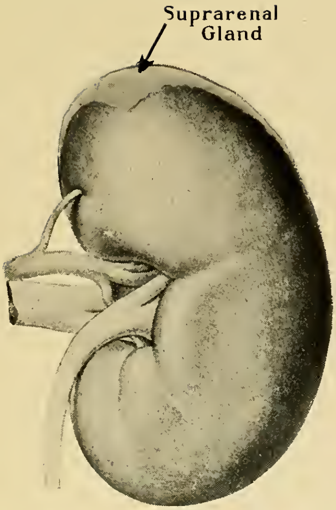
smaller lobes, or lobules, of the size of pepper corns, which are hollow and communicate with a central cavity, the reservoir of the thymus, extending through the entire length of each lateral half of the gland. This is lined by a very vascular membrane and contains a milk-white fluid of an albuminous nature with traces of many inorganic salts held in solution and capable of passing into the circulation by osmosis. The consistency of the organ is very soft, and chemical examination shows that eighty (80) per cent. of its weight consists of water

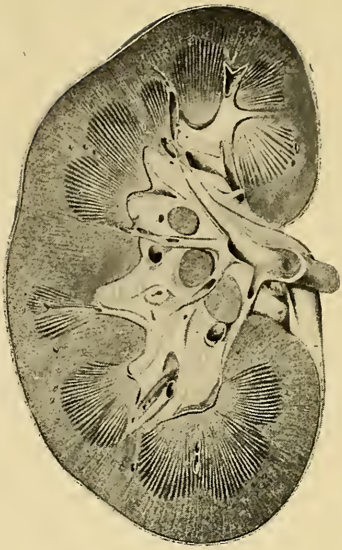
The thyroid gland is superimposed upon the thymus and, as it is above the margin of the breastbone, it can readily be felt at the base of the throat, where it lies between the trachea behind and the muscles and skin in front. It is convex before, conforming to the curve of the throat: posteriorly there is a concavity occupied by the larynx. There are two lateral lobes joined by a slender isthmus; each of the lobes is about two inches long and an inch wide, the right being somewhat larger than the left. This gland has a maroon color and weighs from one to two ounces. It is larger in women than in men, in spite of the usual difference of size between the sexes, and in the disease goiter it is often enormously hypertrophied, while in cretinism (common in the Alpine valleys) it is atrophied. It has numerous blood vessels ramifying through a parenchyma composed of closed vesicles filled with a yellow liquid, in which are found colloid cells and peculiar "dotted corpuscles." Its chemical composition is complex, many substances being present, both organic and inorganic.

The parathyroids are very small glands, four in number, two being in contact with the thyroid's right lobe and two with the left lobe. Their structure shows a network of blood vessels ramifying through a soft stroma containing cells filled with the colloid substance commonly occurring in glands of this group. Prior to the last half century, anatomists regarded these bodies as simply unimportant appendages of the thyroid; but they are now considered as distinct organs elaborating an ergonison peculiar to themselves.

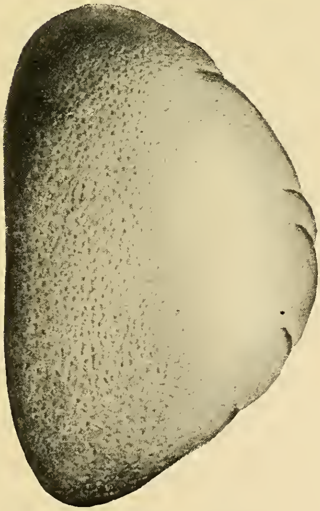
The *spleen* is the largest of the ductless glands, having approximately a length of five inches, a breadth of three and a thickness of an inch or an inch and a half. It weighs about seven ounces; but this weight is subject to much variation among different individuals and also, in the same individual, at different periods of life and under different conditions. It is situated in the upper part of the abdomen on the left side, covering the larger end of the stomach somewhat in the form of a cap. This organ has a purplish color and is very friable, breaking up under slight pressure and disclosing a close network of arteries, veins and capillaries and also channels or sinuses, which are filled with blood; but which have no walls, so that the sanguineous corpuscles and plasma come into immediate contact with the stroma of the organ; very much as water escaping from pipes comes



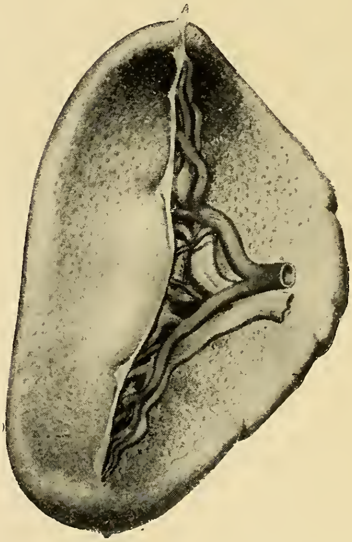
Kidney with suprarenal gland.



Median section of kidney.



Outer surface of spleen.



Inner surface of spleen with vessels.

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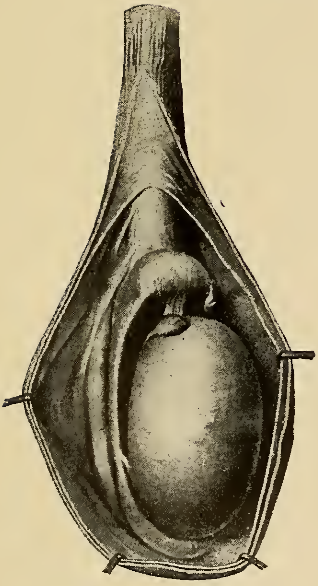
in direct contact with the soil by means of irrigating ditches. This stroma, which fills the interstices of the blood vessels, consists of granular matter, nucleated vesicles, red globules, cells of various kinds and of certain bodies called Malpighian corpuscles, which are peculiar to the spleen and are not found elsewhere. These corpuscles are attached to the arterioles as buds are to the branches of a tree. In structure they are semi-opaque, whitish vesicles, containing a white colloid substance. They become more numerous and increase in size after food has been taken; they decrease during abstinence and starvation causes their entire disappearance.

The *suprarenal capsules* placed just above the kidneys are small glands, yellow in color and irregularly semilunar in shape. Each one is nearly two inches long, an inch and a half broad and one-fourth of an inch thick. The weight is about thirty (30) grains. Immediately within the membrane covering these bodies there is a layer of narrow, columnar masses placed perpendicularly to the surface. These have a deep yellow color and consist chiefly of granules of a peculiar kind, which are unaffected by the majority of chemical reagents. In the center of the glands there is a pulpy substance, almost black in color, containing many nuclei and granules and also a plexus of minute veins. The ergonison elaborated by these organs and which exists in the pharmaceutical extract, named "adrenalin," has extremely active properties.

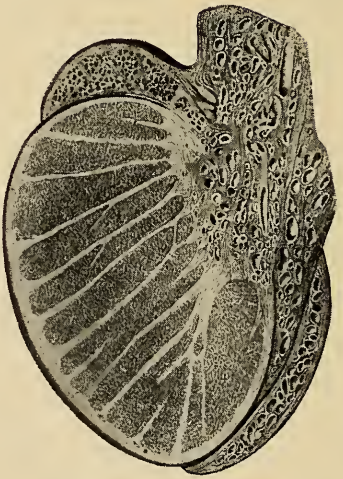
The *sexual glands* have a dual function: beside producing the germinal secretions passing through their ducts, they elaborate an internal secretion which links them with the chain of organs here under consideration.

The *testicles,* the generative glands of the male, are developed in the abdominal cavity of the fetus and, before birth, descend through a ring-like opening into a pouch, called the scrotum. In this they have some freedom of movement, being suspended by the spermatic cords. They are of oval shape, an inch and a half in average length and each weighs nearly an ounce. The anterior part, properly called the *testis,* is the denser portion and is attached posteriorly to a membrane which partly envelops it, called the epididymis. The testis is enclosed by a covering of several distinct layers, protecting the parenchyma, which is the glandular structure, a soft reddish-yellow, inelastic mass. This is divided into several hundred pyramidal lobules, each consisting of from one to three seminiferous tubules occasionally branching and very much convoluted. From each tubule a straight canal proceeds to join other similar canals in forming the retiform plexus, the tubules of which after various changes in form come together at the origin of the spermatic duct. This canal, called also the vas deferens, is nearly a foot and a half long, extending from the bottom of the scrotum upward to the abdominal ring, through which it passes and then takes a downward and backward course through the pelvis to the fundus of the bladder,

Ovary with fallopian tube indicated.



Testicle and its membrane.



Median section of testicle.

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where it terminates in the ejaculatory ducts. These short canals pass into the prostate gland, from which the urethra extends forward and downward through the penis, constituting the last section of the long passageway by which the secretion of the testis, the seminal fluid, is brought to the exterior of the body.

This is the only secretion which travels any distance to reach its destination, a common thing with the excretions. All other secretions are used near the organism producing them and have only a very short way to go from the place of their production.

The *ovaries,* the generative glands of the female, are situated in the pelvis, one on each side of the uterus. They vary considerably in size at different ages, being largest between the period of puberty and the first pregnancy. The ovary, at this time, is oval, pearly white in color and with a smooth surface. It is about an inch and a half long, three-fourths of an inch wide and half an inch thick. The approximate weight is two drachms. The parenchyma of the ovary is a spongy stroma abundantly supplied with blood vessels and containing numerous vesicular bodies termed ovisacs, or Graffian follicles. These are most abundant in the peripheral portion of the stroma and they approach the surface as they grow. Their interior is filled with liquid containing some granules, nuclei and cells. On the side of the ovisac next the surface of the gland, these cells accumulate to form an eminence, called the germinal cumulus, within which is developed the ovum or egg. After puberty, at the approach of each menstrual period, the ovisacs are enlarged, come to the surface of the gland and project through its enveloping membrane, which has grown extremely thin. Finally the ovisacs burst, the eggs escape and are received into the pavilion, or expanded end, of the Fallopian tube, which is the duct of the ovary and conveys its secretion to the uterus.

With the escape of the contents of the ovisac, it fills with blood which coagulates. The walls of the ovisac subsequently become thickened, puckered and contracted upon this blood clot. The mass changes to a yellowish color and gradually assumes the appearance of a spheroidal, corrugated body, named the *corpus luteum.* When this is formed at the beginning of pregnancy it is much larger than when due to the escape of an unimpregnated ovum.

CHAPTER III.

PHYSIOLOGY.

Before considering recent advances in physiological knowledge concerning some members of this group, a few remarks are proper regarding three glands of whose functions we have, as yet, little certain knowledge.

The *thymus gland* was known to the ancient Greek physicians under the same name it now bears Θύμος. The fact that it is prominent in the fetus and attains its greatest development in infancy, before speech has been acquired, led some of the older observers to think that it had some influence upon the development of the vocal organs, whose position is nearby. This opinion is now obsolete. The gland probably affects the extremely rapid histogenesis of the months preceding and closely following birth; but how it acts is conjectural.

The *spleen,* large in size and very peculiar in structure, attracted the attention of the early physicians and was carefully studied. The descriptions they wrote of it, hundreds of years ago, are admirable from the anatomical standpoint. They were confident it existed for some useful purpose and, not knowing what that was, they followed the custom of their time and attributed to it psychic functions, supposing it to be the seat of anger and of melancholy, an opinion which has left its trace in language in such phrases as "a man of spleen," "to give a splenetic answer."

Such a notion was fanciful, but it had some justification. These accurate observers had noticed that patients, whose spleens were enlarged, or were abnormal in other ways, gave manifestations of suspicion, hatred and melancholy. The coexistence of such psychic states with diseases of the spleen is often observed by ourselves. We have rejected the fanciful explanation of our predecessors, but have no substitute to give a rational interpretation to the association of these morbid states.

The spleen doubtless acts as a reservoir for the blood at periods when its quantity is increased, as during the digestion of large quantities of food. At such times the cavernous sinuses of the organ are engorged, while during fasting, they are nearly empty. The gland in this way relieves the arterial and venous walls from undue pressure. Here too the red corpuscles of the blood, having served their purpose in metabolism, begin the retrograde change, which ends in their entire disintegration and elimination. Extracts of the gland's parenchyma have been made, with the design of representing ergonisons there produced; but whether they have any definite physiological action is undetermined.

The *pineal gland* occupies very little space in medical literature: except in anatomical descriptions, it is rarely mentioned and no function is assigned to it. This is strange. When the pituitary body was brought out of long continued obscurity into the light of scientific research, one of the strongest reasons given for its importance was that it had a central location in the base of the brain, the most inaccessible region of the organism; that it was especially safeguarded from external violence and from injuries due to forces acting indirectly and that it had an abundant supply of blood All these advantageous conditions led to the presumption that the organ had important work to perform and that presumption has since been fully justified All these arguments apply with equal cogency to the pineal gland, which lies so near the pituitary, and hence to dismiss it as of little consequence seems a lame and impotent conclusion.

Some of the German comparative physiologists have advanced a theory, which may have checked investigation. They think the pineal bears some resemblance to an optical organ, which exists in some invertebrate animals and hence they adjudge it to be a rudimentary eye, continually reproduced from generation to generation of human beings, who have, without it, two good eyes apiece, and for whom this rudimentary organ performs no service whatever.

The conjecture that the human body contains organs without function is of modern date. It arose when the theory of evolution came into vogue; but it is not a logical deduction from that theory and it has retarded the advance of physiological knowledge; for no one will search for an organ's function if he believes it has none.

As this matter concerns all those parts of the body, whose use is still not understood, it may be profitable to accord it brief consideration. There are two ways of explaining how the organs of animals came into being. The first, and that which for many centuries was generally accepted, is that they were created with the specific design to perform some particular function; just as (to borrow Paley's famous illustration) a watch is constructed by the watchmaker to mark the divisions of time. The second theory is that the organs gradually developed under the influence of environment, in a manner like this. If animals were so situated as to pass much of their time in the water, they made strenuous use of those organs suited to an aquatic life. By use these organs grew stronger and better. The animals having such organs most highly developed had an advantage over others in the struggle for existence and they survived the others, because they were the fittest to survive in that environment. By sexual selection they still further increased these advantages in their progeny. These descendants had the aquatic organs developed better than ever before, and after long evolution, a generation of animals appeared having organs, whose adaptation to the aquatic life was so perfect as to confer upon this generation the characteristics of a new species. If all this be true, then every organ now existing has been gradually developed to perform a certain function, and that particular work it is now doing; and but for the doing of it, the organ would not be here. This last statement is identical with the final assertion reached by the other and older theory.

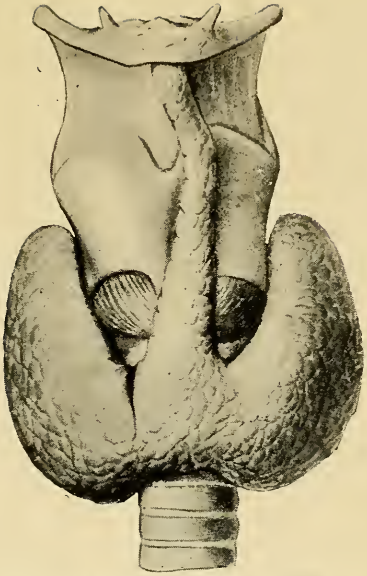
It thus appears that, though these two theories are as far apart as the poles, in their view of causation, they arrive at the same result concerning the necessary connection between organs and functions. Under neither is there any room for a functionless organ. It is true that there are some shreds of tissue, the vestiges of organs, which having completed their work have disappeared, as for instance the atrophied remains of the umbilical cord just back of the navel. These scraps of inert tissue *are without function;* but it is a misuse of language to call such vestiges organs. That a rudimentary and perfectly useless eye should be reproduced through untold generations, to occupy a position in the middle of the base of the brain, far removed from light, protected on all sides from injury and richly supplied by blood—this is a proposition not easy to accept.

When dealing with any organ whose function is unknown, but which nevertheless gives the signs of healthy activity common in vitalized organs, it appears the part of both sound logic and truth-seeking science, to assume that these activities imply the existence of a function for whose performance they combine, and in pursuance of that assumption to strive for the discovery of the function, hoping to add to the broadening domain of science another portion of the unexplored region which extends before us.

The *thyroid gland* has been the subject of much study during the past sixty years; but for the first half of that period the four parathyroids were unknown as distinct organs, being looked upon as mere appendages of the larger body. It was not until the year 1880 that Sandström, a Swedish investigator, described two of the parathyroids as distinct glandules and the other two were not differentiated until thirteen years later by M. Nicolas of Nancy, France. The fact that in some of the numerous thyroidectomies performed upon animals all five organs were excised, in some three and in some only one, introduced many contradictions into the sequels of the experiments and detracted much from their value.

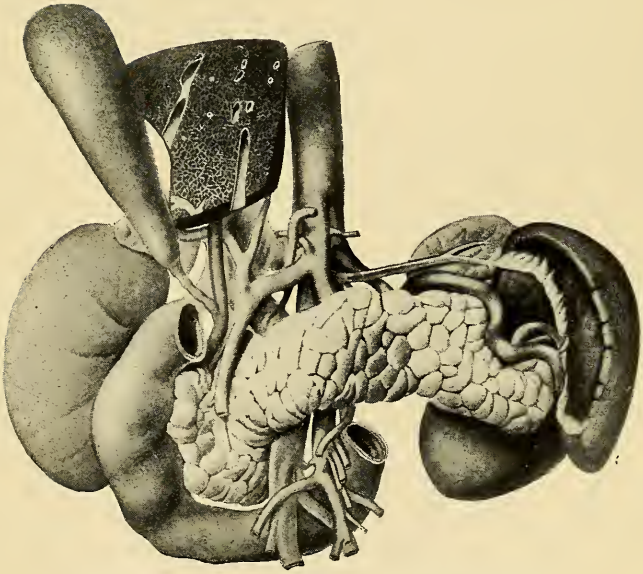
In 1856, Schiff of Geneva sought to secure positive evidence regarding the thyroid function by observing what happened after the organ had been entirely removed. He operated upon dogs, taking out the undifferentiated parathyroids together with the two lobes and isthmus. The animals rapidly declined in health, suffering from weakness, apathy, intermitted by attacks of excitement, disorders of the secretions, tremors and convulsions of a tetanoid kind, sometimes as violent as those of genuine tetanus. Death occurred in from four to five weeks.

It was subsequently shown that the administration of thyroid substance to the sick dogs greatly retarded the



Thyroid gland in relation to trachea and larynx.

From Sobotta's "Atlas of Human Anatomy," by courteous permission of W. B. Saunders Co.



Spleen in relation to pancreas and intestines duodenum.

From Sobotta's "Atlas of Human Anatomy," by courteous permission of W. B. Saunders Co.

fatal termination, which was still more delayed and occasionally even prevented by providing a new organ to replace the one of which the animal had been deprived. This procedure, called "implantation," consisted in grafting upon the inner surface of the abdominal wall pieces of a healthy thyroid freshly taken from another animal of the same species. The transferred tissue formed attachments, blood circulated through it and its peculiar, colloid-filled cells came to elaborate the thyroid ergonison, just as they had done in their former location in the neck. These experiments proved that the gland had important functions in some species of animals; that it was, indeed, essential to life. In the bovines and some other genera, its removal did not prove fatal, the function apparently being assumed by some other member of the group to which it belongs.

The effect of excision upon human beings was thoroughly studied by J. L. and A. Reverdin, surgeons of Geneva (1882), and later by Dr. Kocher of the same city. Thyroid diseases are very common in Switzerland and, during the time when the notion that the human gland had no important function was prevalent, it was frequently ablated, to cure goitre. The mistaken theory cost many lives; for as MM. Reverdin have shown the baneful results that followed thyroparathyroidectomy in dogs were paralleled in man by sequelæ somewhat different, but equally destructive. Among these effects various depressing psychoses and even total insanity were not uncommon.

It is now believed that the fatalities are due to the lack of parathyroids and that, if these be spared, the whole, or the greater part, of the thyroid can be removed from man with comparative safety. The surgical practice of the present time tends in this direction.

It being agreed that the ergonisons of the thyroid and parathyroid glands have most important functions in stimulating and sustaining vital activities in many organs and for many purposes, the question arises whether the ergonisonic force depends upon any single chemical element; upon the inherent, changeless qualities of some one of the inorganic substances, which are regarded as primal forms of matter. There are instances of such dependence in the organism, as for instance phosphorus in the earthy phosphates in the bones. Chemical analysis has shown that these glands are richer in iodine than any other part of the body. Prof. S. P. Beebe of the Medical School of Cornell University, New York, has calculated that each gramme of the fresh thyroparathyroid substance (human) contains three and three-tenths milligrammes (.003) of iodine and proposes that the ratio of iodine present should be accepted as the standard in expressing the strength of the preparations made to represent the ergonisons; so that, if a tablet was labeled as representing ten (10) grammes of fresh sheep's gland, the meaning would be that the tablet in question contained thirty-three (33) milligrammes of iodine,—the other components might vary greatly. Some of the leading pharmaceutical manufacturers have adopted this standard.

It is recognized that some plan of standardization is very desirable; but to depend solely upon the proportion of a single chemical element seems objectionable, when dealing with a substance so complex as an ergonison. Iodine in organic combination acts so differently from simple, elemental iodine, that we can scarcely reason from one to the other. Then too an inorganic standard takes no account of the subtle changes through which an organ may have passed, while playing its part in a living body, changes profoundly affecting the efficiency of extracts made from it; but yet not cognizable by any chemical test. One such change, that effected by castration, is referred to in another chapter.

The desire to secure simplicity and uniformity, to harmonise the results of vivisection with those of the chemical laboratory, is a motive continually cropping out among physiological investigations. We must be on our guard lest by putting assumptions in the place of proof, we shall be led into error and, instead of making more rapid progress, shall not advance at all, but become tangled in a maze of conjecture. Physiology is not an exact science; its phenomena are extremely complicated; it is the part of wisdom to hold firmly the truths already established, to seek patiently for new truths, and to accept nothing upon insufficient evidence.

The most common method of physiological research is pursued by experiments upon the lower animals and these have pointed the way to some valuable discoveries; but there is always present a liability to error, which no intelligence or skill can eliminate. It is due to the great differences existing between man and the lower animals, even those nearest him in structure. Vivisectors are prone to belittle these differences; but the leading scientists now frankly admit them. Alfred Wallace, the venerable survivor of that group of famous naturalists, who were contemporaries of Darwin, has in his latest book emphasized the truth that a bridgeless chasm separates man from all other animated beings. It is said that a boastful vivisector inflicted upon Oliver Wendell Holmes a tedious story of his experiments on frogs, which would greatly advance medical science, and then insisted on the professor expressing endorsement of his theories. Dr. Holmes, fatigued and bored, promised the man a written statement of opinion and the next day mailed to him the following:

> "I might approve your claims from first to last,
> If 'mong amphibians my lot were cast;
> But, as I work in Boston, not in bogs,
> My practice runs to Yankees, not to frogs."

There is another method of experimentation which is free from the defects of vivisection and is, within the scope of its applicability, of the greatest value. By this method healthy human beings are subjected to the action of the substances under investigation. This plan has been used extensively and with admirable success to determine many important questions regarding nutrition and other metabolic processes at the laboratory of the Agricultural Department, under the liberal patronage of the United States government.

The origin of this method can be traced to observations made long ago upon the temperature of the human body. It was noted that the eating of hydro-carbons increased the power of resisting cold; that is, increased the production of heat. If all hydro-carbons were withdrawn from the food supply, then the fat of the body, stored up hydro-carbons, was diminished. It was inferred that hydro-carbons were the heat-producing element, the element which sustained the calorifactive function, and that they were supplied either from an outside source or from the body itself. After many corroborative experiments, the following general theorem was formulated: If a substance existing both inside and outside the body be administered with the effect of increasing the activity of a certain function, that substance naturally supports the same function wholly or partly.

The researches conducted by the author in 1900 were in accordance with this principle. The substance used was the preparation made from the thyroid gland, commercially available at that time. It was administered to persons showing diminished functional activity in certain directions, as evidenced by obesity, flabby muscles, sluggish circulation, pallor of the skin, constipation and intestinal atony. The primary results were very marked: there was rapid reduction of the surplus fat, sometimes as much as a pound a day, with increase in muscular strength and the vigor of the entire organism. It was thus shown that the thyroid ergonison, somewhat crudely represented by the preparation administered, acted as a supporter of the oxidizing process and the catabolism of adipose cells. The various signs of suboxidation had indicated that the blood contained too little of this ergonison.

Later on, some of those, to whom the substance had been administered for eight or nine weeks, showed nervous disturbances such as rapid pulse, restlessness and insomnia. These manifestations in no way invalidated the results previously obtained; they merely indicated that the ergonison's influence extended to other processes than oxidation and fat-catabolism and that the same quantity which served to raise these to the plane of normal activity was an overdose for the others, producing superactivity and excitement. Just so, we find that the same flame, which makes water hot, makes alcohol wholly disappear as vapor.

Other experimenters have worked upon the same line; their results have been corroborated by clinicians, who have studied such diseases as cretinism (discussed in a subsequent chapter), and it is now the prevalent opinion that the thyroid (with the parathyroids) acts by promoting mental, muscular and cellular activity, or in short by augmenting normal metabolism. Furthermore, it exerts a protective power against toxins, whether they originate outside the body, or within it, a power which acts by directly antagonizing the toxic elements which have entered the blood, in whose rapidly moving current the battle rages.

The *suprarenal capsules* possess a marked influence over the circulatory system and they are necessary to life, as has been proved by many experimenters, all of whom found that animals deprived of both capsules died in a short time, though the loss of one was seldom fatal. When, through accident or disease, the human body suffers the entire loss of the function of the capsules, death ensues; but life may be prolonged if one gland continues active.

The most prominent action of "adrenalin," which represents the ergonisons of these capsules, is the increase of blood pressure. It does this both by contracting the walls of the blood vessels and by influencing the heart. In normal conditions these effects are kept within proper bounds by the influence of the ergonisons of other organs, so that the salutary balance is maintained.

Adrenalin has the property of reducing certain chemical compounds by withdrawing part of their oxygen, thus showing its strong affinity for that gas. In accordance with this property it is believed to attract to itself the atmospheric oxygen, through the walls of the pulmonary vesicles, forming with it an oxide, which is borne by the blood to every part of the organism to serve in the renewal of the tissues.

The *pituitary* gland is necessary to life. In animals its excision is followed by a progressive asthenic cachexia, terminating fatally. Removal of the anterior lobe arrests development and leads to infantilism in the young. Extract of the posterior lobe acts as a stimulant to muscular tissue, especially the unstriped fibers: it is a powerful excitant of uterine contraction.

Some of the invertebrates living in sea water are provided with what is called a "test organ," which detects injurious substances, brought in contact with the animal's tissues by the water currents, and enables it to resist their toxic influence. The pituitary is credited with such a property in relation to many of the toxins which by various paths enter the human body. Its ergonisons appear to be energized by the presence of toxins, so that they develop peculiar powers, perhaps to directly antagonize the toxins, or perhaps to so stimulate the leukocytes that they shall destroy the invading microbes and thus protect the life and health of the organism.

As stated in a former chapter, the sexual glands have a dual function. That the *testes* produce the germinal fluid necessary to procreation is a physiological fact that has been known from ancient times. It is indeed one of the earliest truths recognized in the study of the human body. This fluid is secreted through the spermatic duct and hence pertains to that part of the work of the testes, which is similar to the function of the liver and the pancreas. The other work of the testes, that of elaborating an internal secretion, an ergonison, was not recognized until modern times. Our knowledge of this substance is largely due to the experiments of Brown-Sequard already cited. It is produced in the colloid content of special cells located in the stroma of the testis and perhaps also in the epididymis, while the germinal secretion is formed in the seminiferous tubules. It is probable that this internal secretion is primarily an energizer of all the organs connected with the reproductive system; but it affects all other parts of the organism, as is proved by the extensive changes following castration both in man and in the lower animals. The emasculation of human beings is, among us, usually performed on account of disease and this renders the observed results of less value from the viewpoint of physiology. In Asia, where thousands of healthy boys are castrated to supply the demand for eunuch custodians of harems, there is a wide field for the investigation of this subject in a thoroughly scientific way; a field as yet unoccupied.

The production of an internal secretion by the *ovary* is, as in the case of the testis, a function quite distinct from the part this gland takes in reproduction. The ova which are formed in the Graffian follicles and reach the uterus by way of the Fallopian tubes, do not possess the properties of an internal secretion. Unless fertilized and started upon the course of wonderful development of which they are capable, they appear to be wholly inert and speedily degenerate like any isolated particle of protoplasm. The potency of the ovarian internal secretion cannot depend upon the ova: it is attributed to spermin, as in the case of the testis.

The *corpus luteum* is what remains of the Graffian follicle, after the escape of the ova; and it would appear to have served its purpose and to be a mere vestige awaiting absorption; but within recent years it has been demonstrated that this small shriveled body possesses very active properties, potencies which we must conclude remain in its substance, having served some important purpose, while the follicle was at its highest stages of development and while the ovum was reaching maturity in its interior. It is certainly ascertained that an extract made from corpora lutea is capable of very positive sedative effects upon the nervous system, and this, as well as the spermin, should be included in any remedial extract made from the ovaries.

The intimate relation between the ductless glands and other organs of internal secretion, including the sexual glands, which the author has strongly and persistently urged in numerous articles, has been amply proven by the work of Cushing and many other distinguished investigators, as shown in a comprehensive article by Arthur Tatum in the Journal of Experimental Medicine, June, 1913. This gives an exhaustive account of painstaking and scientific researches in experimental cretinism in young rabbits and other animals, which fully confirm this view. By this series of experiments it has been clearly proven that the removal, or loss of function, of one of these glands has a profound effect upon the others. The claim that the swelling, or enlargement which is seen in these glands, after the normal chain has been broken by the removal of one of them, is a compensatory hypertrophy is incorrect. On the contrary, it has been fully shown that there is not a compensatory increase in functional ability, but an edematous condition or vacuolation, which instead of increasing the functions of the remaining glands to perform vicarious work, is in reality a degeneration, which not only lessens the functions of the ductless glands, but also unfavorably affects every tissue in the body. Removal of the thyroid produces an enlargement of the pituitary, or hypophysis, yet there is no increase of functional tissue, but an actual destruction of such tissue, which is replaced by degenerative tissue made edematous by the inbibition of serum.

The sexual glands are similarly affected. The heart, the lungs, the liver, the spleen, the pancreas, the kidneys, the esophagus, large intestine and trachea, the mesenteric glands, the adrenal glands, the bone marrow; indeed, all the tissues of the entire body, even the skin and hair, are affected by the removal of one of these glands (Gley, Hoffmeister, Haushalter, Jeandelize). In a series of experiments upon adult rabbits, cats, and dogs, by Bensen and Kishi, these changes were clearly pointed out. Atrophy of the chief parenchyma of the genital glands and of all the important structures of the body follows removal of the thyroid, according to most of these experimenters. Paton, Leydig, and others have also reached the same result. Hoffmeister, Langhaus, Lancereaux, Lanz, Dolega, Abrikossoff and Halstead made similar observations in different species of animals, including man. Halstead, in reporting an autopsy on a myxedematous dog, states that not only was there a complete absence of spermatogenesis, but also nearly complete absence of the cells of Leydig. It is not unreasonable to argue conversely that in cases of sexual perversion of long standing, where there are marked nervous symptoms and aspermia, or vacuolated spermatozoa (see case No. 1 in Chapter 10), these conditions may be accompanied by degeneration of all the ductless glands.

In Tatum's experiments there was a marked karyolysis in the smaller ova, while the larger ones showed entire absence of nuclei and, in fact, usually degeneration of the cytoplasm. A similar tendency to vacuolation was observed in the other organs of the body.

Schönemann, in making a series of studies on the relation of the thyroid to the hypophysis, in human autopsies, came to the conclusion that the enlargement of the hypophysis is due to degeneration rather than to compensation. Simpson and Hunter could find no iodine in the hypophyses of the thyroidectomized rabbits and concluded that, if the essential secretion of the thyroid gland is an iodised substance, the hypophysis cannot be considered as acting in a compensatory way. Guerrini, Gemelli, deCoulon, Ponfick and others concur in the opinion of Schönemann and prove that enlargement of the hypophysis may be caused by intoxications, such as diphtheritic toxin, snake blood, and intestinal auto-intoxication.

Esser found the bone-marrow of thyroidectomized rabbits to be fatty in character with degenerating megalokaryocytes and he believes the bone marrow to be responsible for the anemia of hypothyroid animals. The spleen of cretin rabbits appeared smaller than normal. Cottman concluded that the general edematous condition of the tissues was not entirely due to cardiac insufficiency, but in part, at least, to a metabolic disturbance. It has been amply proved that both smooth and striated muscular tissue shows marked degeneration in cases of disturbance of the chain of organs of internal secretion.

While most of the work done refers to the thyroid and to thyroidectomized animals, castration produces effects nearly identical in character though not so marked. The amount of iodine in the thyroid is less in the castrated animals than in those remaining intact, and the amount of functionally active parenchyma in the hypophysis is perceptibly lessened; therefore the practice of utilizing the glands of spayed animals for the purpose of producing medicinal products is one that must eventually be abandoned.

In cases of sexual asthenia and impotency, or sexual infantilism, where the functions of the sexual glands are subnormal, the cellular activity of the entire economy is below par, the lack of the internal secretions of the sexual glands producing a softening of the cells of the entire body. The patient is apt to become bloated and the parenchymatous tissues to be water-logged by an increased amount of serum. Their size enlarges, but their functional power is lessened. The patient is often of sallow complexion and his nervous and mental powers are sluggish and depressed. In cases of obesity there is frequently sexual asthenia and the tissues are again waterlogged. In such patients, when the ductless and sexual glands are stimulated and the cellular activity is increased, there often occurs a considerable decrease in the size of their bodies, without any perceptible loss of weight. This is a very remarkable illustration of the effect of squeezing out the excess of fluids in the essential cellular structures, an excess which has caused the increase in bulk, accompanied by a decrease in strength and activity.

The author's daily work and studies impressed him with the importance of the fact that the organs of this group constitute a system; that their ergonisons enter the blood simultaneously and that the physiological action of the group results from the sum of the functions of all the organs in the system. The rational method of ascertaining that united action seemed to be the administration of a substance justly representing the potencies of the entire group. An extract believed to accomplish this purpose was prepared and was used in a series of elaborate experiments with fifty volunteer subjects, all of whom were personal friends of the author. There were twenty-five men and twenty-five women, ranging in age from twenty to thirty-five years, and all above the average in education and intelligence. They were teachers, salesmen, clerks and students. They were not told what was to be done, nor what results to expect, but simply assured that no harm would come to them. They were requested not to ask questions, or compare notes, or discuss the subject among themselves, and thus the psychological element was eliminated as far as possible. These subjects were all in good health, mental and physical. They were weighed, their red and white blood count and hemoglobin estimated and their blood pressure was taken. For one week they were put on a weighed diet, the value of which was figured from König's table. The urine and feces were collected, the total nitrogen, chlorides and phosphates recorded and metabolism was estimated.

After this week of probation, the same experimented subjects received a daily injection of fifteen minims of combined extract of thyroid, parathyroid, pituitary body, ovary and testis. Their diet being controlled, urine and feces were collected and the nitrogenous output was ascertained as before. The blood pressure also was taken every evening. This was continued for two weeks. The results were increased appetite and muscular and mental efficiency, and the sexual vigor was greatly augmented. They were able to stand more mental and physical exertion. They increased in weight, on an average, eight pounds each during the two weeks, and declared that they felt unusually well and strong. The blood pressure, in all cases, was increased, as was also the number of erythrocytes and the hemoglobin. The nitrogenous coefficient was raised from ninety-two (92) to ninety-six (96).

This series of experiments confirms the theory that the ergonisons acting together and mutually modifying each other's activities, as is the natural method of their operation, have power to energize oxygenation by taking up the oxygen brought into the lungs and carrying it to the tissues, of which it becomes a constituent, and also supplying it to enter into combination with substances on their way out of the body and which must be oxidized to the simpler compounds fitted for elimination.

CHAPTER IV.

MATERIA MEDICA AND THERAPEUTICS.

The opinion that the organs of man and of the lower animals have a medicinal value is one of those primordial beliefs which can be traced far back in the history of the race and are found among the most primitive tribes. The eyes of eagles and hawks were eaten to give acuteness of vision; the tongues of nightingales to improve the voice, and the savage warrior would devour the heart of a hostile chief, slain in battle, believing that he could thus add his enemy's warlike prowess to his own.

Throughout the middle ages, the organs of animals, particularly those of fishes, were much used as remedies and they are so employed in the Chinese system of medicine at the present time. Many substances of this sort, rarely mentioned in books, hold a place in domestic treatment. Among some of the Pennsylvania Germans a favorite medicine for bed-wetting children is made by cutting up a pig's bladder, mixing the fragments with finely chopped meat and some rye flour and dividing the mass into small cakes. These are then fried like sausage cakes and fed to the child at supper time, to the exclusion of other food.

With the development of modern medical science, treatment of this kind became unpopular in the profession, partly because many of the doses given proved inert and because they were associated with superstitions; but mainly for a very different reason. The wonderful development of chemistry, both organic and inorganic, during the last century, brought forward a multitude of new drugs: acids, salts, vegetable alkaloids, and many others. Their composition was definite, their formulas exact, their appearance attractive. Their accuracy and thoroughly scientific character made a profound impression upon the professional mind. These drugs seemed so superior to the crude remedies which they superseded that they engrossed the attention of the profession and physicians came to regard with disapproval, akin to contempt, the former medicines, indefinite in composition, unpleasant to take and often prepared extemporaneously and unskillfully.

Such sentiments were prevalent for a number of years; but recent times have witnessed a very marked reaction: a reaction which demands a painstaking investigation of all the methods which have at any period gained popular confidence, believing that the trust reposed in these methods has been due to inherent value, although this value may have been mixed with much that was useless.

Men having the medical instinct, some in the ranks of the profession, some among the laity, sought to utilize the organs of the body in treating disease, because they felt a want which other things did not supply. They were groping in the dark; but they recognized the truth that the efficacy of mineral and vegetable pharmacons had limits and beyond these boundaries lay a field of therapeutic uncertainty. Even with the splendid array of remedies provided by modern chemistry, that region of doubt still stretches away before us. There are still morbid processes which we cannot arrest with any degree of certainty. When our medicines appear to control them, we make only the modest claim expressed in the oft-repeated statement: "In a majority of cases these remedies seem to be beneficial." And yet we often witness the cessation of such abnormal processes even in the absence of any treatment. Then we attribute the cure to nature: to some beneficient remedy produced in the organism itself: to something more subtle, more recondite, more intimately associated with the secret of life, than anything we can make in the retorts and test tubes of our laboratories.

Two hundred and fifty years ago, the famous English clinician, Sydenham, was profoundly impressed by this truth. His evidence was wholly clinical. He lived in an age when bacteriology was unborn and when the other sciences were in their infancy; but his experience at the bedside convinced him that the organism itself produced a remedial agent of greater potency than any we could manufacture and he gave to it that famous name, that perfect definition, which has ever since been upon the lips of clinicians: "Vis Medicatrix Naturæ."

With great earnestness and eloquence he taught that the duty of the physician was to act as a watchful and patient observer, awaiting and expecting the manifestation of this mysterious, potent force; it was his function to remove obstacles from its path, to assist its action, as much as possible, to co-operate with it whenever he could. To render such aids was the legitimate work of drugs; in such minor rôles they were useful; but hope chiefly depended upon the Vis Medicatrix Naturæ.

Most insistently Sydenham uttered his warning against thwarting or obstructing this natural force by ignorant dosing and meddlesome interferences. The caution was most timely and important, for he lived in an era of medical theories, founded upon metaphysical deductions far more than upon scientific facts, and the profession was divided into medical sects bent upon exploiting the claims of rival methods of treatment.

Sydenham did not attempt to explain the nature or source of the great force, whose effects he so clearly recognized and taught, nor to reproduce it, or imitate it. Ultimate therapeutic wisdom, in his view, was to await its manifestation and give it a free and unobstructed course. He founded the expectant treatment, as it is called, and within a hundred years his opinions were generally accepted throughout the civilized world.

Those opinions continued to dominate medical thought until very recent times. The majority of clinicians occupied an attitude of expectancy, hoping the Vis Naturæ would come to their aid, and doing what they could to remove obstacles to its action; but they neither solved its mystery nor sought to reproduce it outside the body. It is a significant fact that the main duty of the surgeon, whose place in the healing art is now more prominent than ever before, is to furnish an unobstructed path for this force. He opens an abscess, so that by the escape of its contents the reparative process may be allowed to proceed; he removes from a ureter an obstruction damming back the excretion of the kidney, and the inflamed and distended organ recovers its normal size and function; he ablates a tumor pressing upon some venous or arterial trunk and the embarrassed circulation resumes its healthful flow. At all times and in all regions he is removing hindrances, so that the Vis Medicatrix Naturæ may have a chance to do the rest.

Until recently little beyond this has been attempted by medical science; but now, in conformity with the intensely aggressive spirit of the age, a new era opens. We are now striving to isolate and to reproduce this Vis Naturæ, this most powerful of remedies; to procure pharmacons endowed with its potential qualities and to administer them in such ways as to influence the organs of the living body, just as these organs are influenced by the intrasomatically prepared fluids upon which their activity and normality depend.

The change in medical practice is analogous to that

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which has revolutionized the agriculture of some of our western states. Formerly the farmer removed the stumps and stones, dug ditches and loosened the soil with the plow, to prepare his field for the fructifying showers. Then he waited expectantly for rain. If rain came in sufficient quantities all was well, but upon that little word *if* depended the issue of success or failure. Now, after the ground has been prepared, he opens the sluice-gate and the fructifying water comes to his field in just the quantity and at just the time he desires. Full well may the western farmer say: "Irrigation is far better than Rain." With equal truth we can assert that the rational and skillful administration of the potent extracts derived from the glands of life will prove far more curative than the time-honored expectant treatment. It was right as far as it went; but it did not go far enough to reach the great achievements to which hope now beckons us.

There is a widespread anticipation that we are close to the dawn of a brighter day, a day in which our knowledge will be greatly broadened and our power to heal wonderfully increased. This hope is not confined to the young and optimistic members of the profession, but is shared by many who are cautious and critical. Even Sir William Osler, whose cynicism is so well known, declares that he expects the next few years will witness great therapeutic progress along this line (Osler, cited by H. R. Harrower, Medical Council, Philadelphia, April, 1913).

As was shown in Chapter 3, the remedial force we seek to employ is inherent in the ergonisons, or internal secretions, of the ductless glands and of some other organs. The sole avenue of egress for these fluids is the blood vessels ramifying through the parenchyma of these bodies. The ergonisons therefore enter the circulation and are mingled with the plasma of the blood. We cannot isolate them from its other constituents, we cannot even distinguish them as they are borne along in the rapidly moving stream; but we know they are there and that they retain their peculiar characteristics and potencies. Admittedly the subject is beset by mysteries. The plasma of the blood is a wondrous storehouse of subtle essences as elusive as the latent heat and unmanifested magnetism which exist in a bar of iron, but which cannot be discovered by any microscope or demonstrated by any chemical reaction. The precise composition of these ergonisons we do not know, but we know something of their effects and we know that we can procure them from the organs, by which they are produced, and utilize them for the restoration of human health.

In bringing these ergonisons within the scope of materia medica, the first thing to be considered is their source. As we are not able to separate them from the blood, we must derive them from those organs in the lower animals, which correspond with the human organs, whose activities we wish to duplicate. The species selected should be one not subject to diseases communicable to man. Sheep are for this reason preferable to cattle, because they are rarely affected with tuberculosis, which is a common malady among the bovines. Chickens also are free from diseases transferable to the human organism and have the special advantage of containing more soluble active ingredients. Every animal selected for this purpose must be in the prime of maturity and adult vigor, entirely free from disease and intact. Castration or spaying renders their glands unfit for such use. This is an important matter which has been entirely overlooked by the medical profession until attention was called to it by the author. Animals slaughtered for food purposes at abattoirs have been castrated in their youth to improve their flesh for food purposes, and the effect upon their ductless glands has been even greater than upon their muscular tissue; therefore, these glands should all be considered pathological, as the animals themselves are in all probability neurasthenics. Emasculation not only abolishes reproductive power, but profoundly affects nutrition and produces marked changes both physiologic and psychic. Richter demonstrated that castrated dogs consume proportionally less oxygen than intact dogs. Offergeld showed that the ovaries influence the metabolism of inorganic matter and thus aid in maintaining the normal composition of the blood. The increased quantity and improved quality of the flesh, in animals castrated for food purposes, is well known, as is the change in disposition of the bellicose bull, which becomes the dull and slothful ox; the fiery stallion tamed to the tractable gelding and most notably, that exemplar of intense virility, the domestic cock, which loses his superlative egotism, drops his pompous strut and becomes as indolent and timid as a hen, while the ringing voice of chanticler sinks into the gutteral squawk of the capon. Care, therefore, must be observed that the glands be taken from intact animals only. Furthermore, their removal should be affected under rigid aseptic precautions.

In the early years of organotherapy, it was usual to administer by the mouth fresh glands from recently slaughtered animals and some good results were obtained, although raw animal substances are liable to be spoiled in many ways. A more convenient method was subsequently introduced by various manufacturing pharmacists, who dried the glands, pulverized them and compressed the powder into tablets of definite size and weight. These tablets took a recognized place among pharmaceuticals and are widely used. There is considerable difference in the strength of the products of different makers and there is no assurance that the glands have been taken from intact animals; nevertheless, most of the clinicians seeking to utilize the ductless glands have, to a large extent, employed tablets.

Meanwhile, many physiological chemists have been endeavoring to isolate the active principle of the glands in a form having a definite chemical composition, a form somewhat analogous to the alkaloids of the vegetable drugs. The greatest success yet reached in this direction is that of Abel, who has found in the suprarenal bodies an active principle, which he has named "Epinephrin." He has combined it with hydrochloric acid to form a hydrochlorate and from this has calculated its chemical formula. In this we have the familiar symbols, H O N C,* so constantly appearing in the formulas of organic chemistry with a great diversity in the proportions of the different elements. Such formulas give the physician little help; for they convey no information as to the physiologic action, or the therapeutic value of the substances for which they stand.

Knowledge of this sort is interesting; but the present tendency to isolate the active principle of every remedial agent is carrying refinement of pharmacy too far. Quinine is undoubtedly the most active principle of cinchona bark, but it by no means represents the bark in its entirety. Morphine is the most active ingredient in opium, but it comes far short of representing all of opium's therapeutic potency. Caffein is the active principle of coffee, but it does not represent coffee completely. Those who conducted a recent series of experiments with caffein claimed to have demonstrated that it represents the entire physiological action of coffee; but almost any experienced physician can recall patients to whom he could give caffein without causing any intestinal disturbance, yet the drinking of coffee at once produced in these patients an abnormal gastro-intestinal fermentation.

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*Hydrogen, oxygen, nitrogen, carbon.

What is true of these vegetable substances is equally true of those in the animal kingdom. The present tendency is to seek for an active principle in each gland and, if it be found, make use of it to the exclusion of all other constituents. This is a mistake. The glands and their internal secretions are extremely complicated and delicate in their composition, and there is no single substance which, when separated from the other components, is able to represent all the potencies of the entire gland. Some of these organs contain substances having diametrically opposite qualities; but when combined these antagonistic substances maintain an equilibrium, or balance, by acting as checks upon each other. This balance produces and maintains the normal activity which constitutes health.

Physiology furnishes many instances of equalizing interaction, familiar illustrations occurring in the process of digestion. Many ferments act only in the presence of another substance, which while not entering as a constituent into the resulting compound, is necessary to the process by which that compound is produced.

Mindful of the fact that the quest for isolated active principles too strenuously pursued may lead to the serious error of excluding some element of great value, we should avoid this danger. On the other hand, the proper administration of ergonisons requires a preparation in liquid form available for uses quite impossible if we had nothing except tablets. Alcohol, so frequently employed in making vegetable extracts, cannot be used with animal substances on account of its quality of coagulating albumen; but glycerine is free from this drawback and it is capable of taking up the active principles of the glands and also of acting as a preservative.

In the author's opinion this is the best menstruum available. It is used chemically pure and the extract made with it is guarded against any possible contamination by keeping it in hermetically sealed glass ampules, each of which contains only a small quantity, scarcely two cubic centimeters, sufficient for a single injection.

Whether the ergonison of each gland should be administered by itself, or whether those of several glands should be mingled together, is a question whose answer depends upon both deductive and inductive reasoning. The fundamental claim in favor of organotherapy is that it so closely imitates physiological processes. Now all of the ergonisons pass from the glands into the circulation and exist together in the plasma of the blood. It is an obvious deduction that when we administer them medicinally they should be in company one with another. As they act conjointly in the healthy body, we may well fear that the introduction from without of a single one, separate and alone, may disturb the harmony of the organism.

The inductive argument consists in the evidence drawn from clinical experience. The author prepared an extract from four glands, whose ergonisons he regarded as representing the active properties of the group. This was at first used tentatively with extremely careful observation of its effects. It was not brought before the profession until it had been administered to more than four hundred patients during a period of more than four years. Results were not announced until enough time had elapsed to judge of remote consequences, as well as of immediate effects. The results achieved at that time have been confirmed by a large number of subsequent cases, supporting the conviction that the preparation is based upon correct principles.

This remedy is denominated a polyglandular extract, and the method of its production, as perfected by experience, is the following: The animals used are sheep four years old and cocks whose age is one year and a half; they must in all cases be intact and in vigorous health. Under strict aseptic precautions the testicles are taken from the cocks and the ovaries, pituitaries and thyroids (with the parathyroids) from the sheep. The fibrous tissue of the organs is removed as thoroughly as possible, the parenchyma only being retained. A mass is then made by taking of each organ the following proportion by weight: pituitary, one part; thyroid (and parathyroid), two parts; ovary, ten parts; testis, ten parts. This mass is reduced to a fine paste and incorporated with an equal weight of chemically pure glycerine. The mixture is allowed to mascerate for forty-eight hours, is then filtered and the filtrate, a clear, colorless liquid, is sealed up in ampules having each a capacity of two cubic centimeters.

The proper administration of a remedy is quite as important as its skillful preparation. Many times the value of a remedial agent is destroyed by changes it undergoes upon its passage from the lips to the organ which it is intended to influence. The risk of such alteration is peculiarly great with a substance like the polyglandular extract, whose subtle potency depends upon the delicate adjustment of vitalizing forces. So many things enter the stomach that its contents are unknown. The substances there encountered might have a very damaging effect upon this extract, might indeed render it wholly inert. For such a remedy the pathway of the mouth, gullet and stomach is a rocky road to travel and we must find a better entrance to the body.

Fortunately, this better entrance is furnished by intramuscular injection. Here again there is a close imitation of the natural process; for the injected fluid is deposited in a highly vascular tissue, from which it is rapidly absorbed into the plasma of the blood, encountering upon its course no unnatural or hostile substance. The spot usually selected for the injection is the gluteal muscle of the buttock upon the right side and the instrument is an all-glass syringe armed with a short needle of keen point and fine caliber. This syringe is sterilized by boiling each time before using. In an experience of thousands of injections, no deleterious reaction has ever been observed. The author's favorite site of injection is a point on the right gluteal muscle midway from above downward, and about a half inch to the inner side of the muscle.

He has discovered by accident that this point is very much less sensitive than the corresponding point on the left side or any other portion of the body, and this discovery has been borne out by a very wide experience in several thousand injections. He can offer no explanation for this, but experience has proven its truth.

In subsequent chapters details will be given regarding the use of this polyglandular extract in a number of diseases. A general statement of its therapeutic value may be made by saying that it raises vital processes to a higher power. Among its specific activities are the augmentation of oxidation, stimulation of nutrition, acceleration of tissue change, the normalizing of blood pressure and the restoration of the organism's susceptibility to drugs, which through long-continued use have lost their effect.

CHAPTER V.

METABOLISM.

The therapeutic power of the biogenetic (vitalizing) extract derived from the ductless glands is exerted through its influence on metabolism and it is important to gain a correct idea regarding this process.

The word metabolism (μετά+βάλλω) signifies a radical change. Metamorphosis is a change in form, or appearance; but metabolism means more than that and indicates an alteration of the substance itself. It is necessary to bear this in mind, for many things are so changed in metabolism as to have qualities wholly different from their original characteristics.

Lippincott's Medical Dictionary defines metabolism as: "The process by which living cells or organisms are capable of incorporating substances obtained from food into an integral part of their bodies. The changes that proteid and other constituent substances undergo in the body. It is constructive (anabolic) when the substance becomes more complex and when destructive or retrograde and the substance becomes simpler, it is called catabolic." Dorland's Medical Dictionary says: "Metabolism is the change produced in substances by the action of living cells upon them, the process by which living cells or organisms incorporate the matter obtained from food into a part of their own bodies. Constructive metabolism, or anabolism, is the change of matter from a lower to a higher state of organization, especially conversion into protoplasm (note the signification of ἀνά upward). Destructive metabolism, or catabolism, is conversion of matter, especially protoplasm, into a lower state of organization, and ultimately into the waste products (κατά downward).

Neither definition covers the whole field, as metabolism includes all the phenomena of life, which pertain to nutrition and energy either psychic or physical. The processes include not only repair of the wear and tear of the body, but the supply of material for growth and development; not only eating and drinking, but breathing, using and resting the muscles, the brain, burning up the waste products by oxidation and eliminating what remains, after this combustion, through the excretory routes.

In considering that part of metabolism which relates to the eating of food and the subsequent phenomena, it is proper to begin with the *materia alimentaria,* with food itself. Man is omnivorous and, although his digestive apparatus lacks the complicated mechanism which enables herbivorous animals to subsist upon the grasses and leaves and stocks of many plants, yet he can make available a great number of vegetable aliments by subjecting them to rational preparation. In this respect he differs vastly from the carnivorous creatures which resemble him in structure, but never acquire any knowledge of preparing food, and hence in adult life are restricted to the eating of flesh—the only thing they can digest in a crude, raw condition.

The ability to modify his food before eating it, an endowment possessed by man alone among living beings, opens before him a wide range of edible substances and gives him opportunity for variety in his diet, a variety which experience has proved to be most desirable for several reasons.

Healthy foods, whether animal or vegetable, must be unspoiled; that is, they must be free from putrefactive change,* even the slight alterations often signified by the word "stale." As such changes begin very soon in animal products and in many "perishable" fruits, there is a great difficulty in furnishing them unaltered to consumers living at a distance from the sources of supply.

A large territory of agricultural land is necessary to feed a populous city, long distances must be traversed and, in spite of every effort to secure rapid transportation, the transfer cannot be accomplished within the very brief interval before deterioration. Prior to the middle of the last century, hardly any effort was made to overcome this difficulty. Transportation was slow, the methods of distribution cumbrous and the dwellers in great cities, except the very rich, had no thought of getting recently gathered fruits or the flesh of recently slaughtered animals.

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*This statement is flatly contradicted by the fact that in parts of eastern Asia, people eat with impunity rancid butter, partly incubated eggs and even putrifying fish. Regarding the existence of this practice there is no doubt. There is also no doubt that among us the eating of such disgusting articles would usually be followed by ptomaine poisoning. Why brown and yellow men on the western shore of the Pacific can thrive on what is toxic to white men upon the Atlantic seaboard has not yet been explained. The statement made in the text applies to conditions in America and Europe.

To prevent the putrefaction of foods, three plans are used: (1) refrigeration, (2) air-tight canning, and (3) the addition of some antizyme, some substance which chemically prevents decay. The first two methods are of modern invention and, although sometimes misused, like other good things, they have proved a great boon to the masses, enabling them to enjoy a varied diet, which only a hundred years ago was the exclusive privilege of the wealthy. The third plan, the use of antizymes, of which common salt is an example, has been followed for many centuries and without it the growth of great cities in the colder regions of the earth would have been impossible; for animal food of some sort was made necessary by the rigors of the climate.

None of these three plans keep food fresh. It may be unspoiled and edible; but only what is recent is *fresh*. To apply this term to articles kept in storage for months is confusing, misleading and, in business transactions, dishonest. Refrigeration has been of especial advantage with meats, which undergo but slight change in cold storage. Prior to its introduction, salted beef and pork and fish were almost universally used and scurvy was widely prevalent. The crews of sailing ships, confined to these salted meats during the long voyages of those days, were sometimes so afflicted by this disease that their vessel was forced to seek some port of refuge and take on board new men. In our time scurvy has well nigh disappeared and with it other affections due to the same cause. The harm done by the salt was wholly owing to the great excess in which it was taken; for this substance, chloride of sodium, is a normal constituent of the blood and in proper quantity is so necessary that wild animals instinctively seek it, as is shown by the hoof-beaten trails through the forest leading to brackish springs or pools, called salt-licks by woodsmen. The antizyme next in importance is sugar, which, in the moderate quantity required as a preservative, is quite innoxious, though indulged children often load their stomachs with it, in the form of candies, and bring on serious troubles.

The enterprise of foodpackers, who sought to find some cheap and efficient preservative, led to the somewhat famous controversy centering in the government laboratories at Washington and finally brought before the President of the United States. This controversy was so widely published that the name of Dr. Wiley, "the poison squad," benzoate of soda and salicylic acid became household words. Briefly stated, the dispute was as follows: The official chemist claimed that the use of antizymes, except common salt and sugar, was injurious to health, because the substances employed had poisonous properties. The firms criticised claimed that, while the chemicals they employed were poisonous in large doses, they were quite non-toxic in the minute quantities required when used as antizymes. There was truth on both sides. Investigations made by the author prove that foods preserved by chemicals (except sugar and common salt) are injurious: they also confirm the statement that very small doses of these chemicals are not poisonous. This seeming paradox is explained by a fact, which unfortunately was not brought to light in the long public controversy. The chemical preservatives referred to, render the food hard to digest, and it is this indigestibility which is the first stage in the succession of injurious phenomena.

This important truth was discovered by the author in the following way: A lad of ten years, suffering from an attack of acute gastritis, vomited freely and threw up a large piece of preserved peach, which he had bolted unmasticated. Careful questioning brought out the fact that this piece of peach had been eaten at least forty-eight hours before. Upon careful examination it gave no evidence of digestion. It had evidently been driven back and forth by the muscular action of the stomach and being unable to pass through the pyloris, had been finally expelled by vomiting. During all of this time the gastric juice had been unable to make any impression upon it. The interest awakened by this peculiar incident led to careful experimentation by laboratory methods, the results of which, together with the technical details, were published in the Medical Council, August, 1912. Here it may suffice to say that the following proposition was demonstrated, viz: Preservatives added to foods to prevent decay (except sugar and common salt) retard digestion in direct ratio to the extent of their preservative power. The results of delaying digestion in this way are readily traced. The increased work thrown upon the stomach augments the blood supply of the gastric muscles, because of the extra peristaltic action: the efforts of the organ to complete digestion produce hyperemia of the gastric mucosa: these effects increase the secretion of gastric juice, causing hyperchlorhydria. This process, if continued, results in chronic hyperacidity, gastric hypertrophy and ultimately dilatation of the stomach.

It thus appears that the salicylates and other antizymes are deleterious, not because in themselves poisonous, but because the foods preserved by them are rendered so difficult to digest as to inaugurate a series of abnormal effects, leading finally to organic disease. On this account sugar and common salt are the only preservatives that should be used and even these in no larger quantity than is required to attain the purpose in view. Regarding salt it should be added that although it is a normal constituent of the organism, harm results from its excessive use. The author's experiments proved that added to food in the proportion of one-half of one per cent., it does not retard digestion, in the proportion of one per cent. it retards digestion 5.05 per cent., and with one and a half per cent., the retarding is 6 per cent. This fact is important in connection with the injurious effects of a diet of salted meats referred to above.

It may be considered a fundamental principle that our food should be unspoiled and in a condition as near to the fresh state as our distance from the sources of supply will permit. Another basic principle is the need of variety. It is true that life may be sustained by some single substance which contains the indispensable elements, as sailors on becalmed vessels have subsisted for a long time upon sea-biscuits; but to maintain health and efficiency at a high plane, diverse foods are required. Those living exclusively upon meat, as certain savage tribes do, are apt to be diminutive, while those eating cereals only are also commonly small in stature. Eating meat stimulates the glands governing growth, namely, the pituitary, thyroid and sexual glands. The secretion of the thyroid is increased by a nitrogenous, or meat diet. Here is an illustration of the state of equilibrium maintained by nature; for the nitrogenous foods taken in large amounts produce toxins, which are neutralized by this extra secretion of the thyroid, and thus the balance is kept intact. It might seem that the only thing necessary to increase stature would be to indulge in an abundance of nitrogenous food; but this is a mistake. It was proved by Hunter and Watson in their experiments upon rats and other animals that an exclusive meat diet produces degeneration of the thyroid and in consequence stunts the growth. On the other hand, a purely vegetable diet, as was shown by these same authors, inhibits growth and development. The Chinese, Japanese and the inhabitants of the Philippine Islands, who live almost exclusively upon rice and millet, are diminutive in stature. The vegetarian aborigines of South America are thin and most of them of small stature. When they are brought to civilized countries and given a mixed diet, they soon show an increase in flesh and a general development of the organism. These facts all point to the importance of a variety in food.

To support life and to produce strength, physical and mental, are the rational motives for taking food; but if there had been no others, the human race would not exist. To preserve it, motives are required, which will act during the early periods of life, when rational considerations are not even thought of. The two motives, which have always induced human beings to gather food from earth and air and sea, are dread of the pangs of hunger and desire to gratify the sense of taste. These motives influence the lower animals also, but the second in only a slight degree. Their desires are simple and have but a narrow range, while human appetites, natural or acquired, crave a great diversity. This craving while liable to much abuse serves a useful purpose, when rationally controlled. It leads us to partake of condiments, flavoring substances and other things besides the bare proteids, hydro-carbons and carbo-hydrates essential to sustain life. These additions are termed subsidiary foods. Although not indispensable to the nutritive process they assist it, by whetting the appetite and thus stimulating the secretion of the digestive ferments, like the gastric juice; they also leave a residue which aids in eliminating waste products, the results of retrograde metabolism. Some of these subsidiary foods have antitoxic properties, though in a minor degree.

The food supply of the body passing through the oral gateway is first ground up by the teeth and thoroughly mixed with the saliva. It then enters the esophagus, or gullet, on its journey down the alimentary canal. This canal may be considered a laboratory in which nature affects many chemical and physiological reactions of a complicated kind. After being ground and insalivated the mass is mixed and stirred continually by the action of the gastric and intestinal muscles, aided to some extent by the muscular movements of the diaphragm, of the abdominal walls, and even of the limbs. During this mixing process there is poured into the mass a number of fluids secreted by the glands which are situated along the course of the canal, each secretion having its own special function or functions, and while all these additions are being made, the whole is kept at a temperature of almost one hundred degrees, heat being an important condition for affecting the reactions in progress. Much time is necessary for this work and the canal is so constructed that the mass it contains passes downward slowly. The alimentary tract is long and tortuous; it expands into large receptacles and in the intervals becomes very narrow. Its soft and flexible walls often come in contact, making an apparent closure; but although they touch, they do not adhere and rapidly separate with the impact of the digesting mass. This approximation of the walls and the action of valves co-operate in making the movement gradual, while entire cessation of motion is prevented by the peristaltic action of the muscular walls of the intestines.

It is obvious that the process taking place is far from simple. Its complexity is greatly increased by the presence and activity of vital force. This differentiates the gastro-intestinal laboratory of nature from all others and renders it so difficult to determine with accuracy the methods by which the results of metabolism are attained. In our laboratory experiments, no matter how skillfully conducted, there is always this defect that we cannot exactly duplicate the natural processes, because we cannot command vital force. Of the multiform changes that the digesting mass undergoes in its course through the canal, most are anabolic; the materials are altered into substances more complex, more highly organized. When so changed, these substances are withdrawn from the canal by the lacteals and other absorbing organs. Some components, such as the mineral salts, are directly taken up by the blood vessels themselves.

The residue, consisting of undigested, inert material with the addition of certain retrograde products cast into the canal by organs doing some excretory work, collects in the large intestine, whose walls contain hydroscopic organs that withdraw enough water to make the mass semi-solid. In this state it accumulates in the rectum until its pressure starts the nervous impulse which brings about defecation, and the mass is expelled as a retrograde, excretory product.

The nutritive substances elaborated by the anabolic processes pass from the alimentary canal into the lymphatic vessels or directly into the blood itself, in both cases their ultimate destination being the various organs for whose repair and functional activity these substances are needed. Now occurs the change called histogenesis, the last stage of anabolism. In this the nutrient material, having taken the form of vitalized cells, enters into the structure of the various organs of the body. These cells are endowed with the specific qualities and powers adapting them to the special function, which they now begin to perform and which they continue to perform during the period of their vitality and until, having served their purpose, they are oxidized, disintegrated, carried away by the excretory channels and replaced by new cells.

It is at this state of metabolism, the process of histogenesis, that the organs of the adrenal system appear in the place of supreme importance. From the author's physiological experiments upon fifty normal subjects (see Chapter 4), it is inferred that an organ's increased functional activity is due to an increase in the quantity of ergonisons present in the blood. The organ's increased activity is accompanied by more rapid metabolism of its cellular constituents. The question arises, how do the ergonisons produce more rapid metabolism? Following the trend of Professor Erhlich's reasoning regarding cellular activities, three methods are suggested. Perhaps all are actually employed, for nature often uses several ways for reaching the same end.

In accordance with the first method, the process is this. One of the cells of an organ is performing its function slowly; the ergonison borne to it by the blood acts as a stimulant; the cell appropriates more of the nutrient material within its reach (material prepared from food by previous anabolism) and vitalizes this nutrient material, which thus histogenetically becomes an integral part of the organ, taking part in its functions.

The second plan presumes that in the blood current are cells recently formed from the food and far advanced in organization. They have nuclei surrounded by protoplasm, but are not yet endowed with any specific, special potency and could be used anywhere. The ergonisons impart to the organ the power of attracting such cells and, when they enter its stroma, they are retained and embodied with its other cells acquiring identical functions.

The third view regards the influence of the ergonisons as primarily exerted upon the unspecialized cells carried by the blood. In them is produced an affinity for some certain organ and, when that organ is reached, the cell stops traveling, attaches itself to the organ and adopts its characteristics and functions.

No positive assertion is made regarding these methods of action. The value of any scientific hypothesis depends upon its capability of explaining the observed facts and these theories are proposed as offering a fair explanation of the phenomena discussed in Chapter 3. Whatever may be the method by which the physiological forces act, it is an established fact that the glandular group, elaborating the internal secretions, controls and equalizes the histogenetic processes which develop and repair the tissues and are absolutely essential to the maintenance of vitality.

CHAPTER VI.

TOXINS AND AUTO-INTOXICATION.

The word *toxin,* derived from the Greek τοξικός, in its original and wider signification meant any poison and it still retains this meaning in its compounds, such as toxicology, but in present usage it is not applied to such poisonous substances as arsenic or strychnine; but is restricted to those produced by microbes, or by disorders of Metabolism. The two important processes, by which organic substances pass from a complex to a simpler composition, either within the body or outside, are fermentation and putrefaction. To both of these oxygen is essential and both require the presence of germs. The toxins of putrefaction include both microbes of virulent nature and poisonous chemical compounds which are not vitalized; but which have been produced by microbes. The present discussion deals with toxins of these kinds, omitting any consideration of the bacteria of the infectious diseases, such as diphtheria and typhoid fever.

The putrefactive toxins are divided into three groups, in accordance with the place in which they originate. The first group is produced outside the body and embraces the ptomaines, a word derived from πιῶμα meaning a corpse, a carcass. The second group has its origin in some part of the alimentary canal, as is indicated by its name, enterogenous. The third group is originated by arrest of the catabolism of substances either in the blood or the tissues and which, on account of this stoppage, become abnormal and injurious. These toxins are termed histogenetic.

The production of a ptomaine may be illustrated by a spoiled oyster. This mollusk decomposes rapidly and has caused many fatalities. The oyster removed from the water and kept in warm air soon dies: with relaxation of the muscles, its shell opens slightly: through this fissure much of its blood escapes and bacteria find an entrance. The germs at once start the putrefactive process. Some careless or dishonest vendor transfers the dead mollusk from its shell to a plate and it is swallowed by some hungry man, whose senses of smell and taste have perhaps been recently blunted by alcoholic drinks. Its repellent flavor may also be concealed by additions of pepper, vinegar and horse-radish. The noxious morsel reaches the stomach, a warm receptacle where the germs multiply with great rapidity. Nature sends against these invaders the leukocytes, which can combat them to some extent: the blood bringing the leukocytes produces intense congestion of the gastric mucous membrane. At this point nausea may be excited and all the contents of the stomach may be expelled by vomiting. This is the best thing that can happen: if it does not occur, the germs speedily make their way to other parts of the body with serious, perhaps fatal, consequences.

To explain enterogenous toxins, we may consider what results from an obstruction to the flow of bile. The chyme, which has passed from the stomach to the intestines, is in the course of metabolic change and contains various microbes which are capable of mischief, but which under normal conditions do no harm; because the antiseptic action of the bile renders them innoxious. When by any cause the outflow of the bile is arrested, the evil propensities of the microbes are not restrained and they become dangerous enterogenous toxins.

An example of a histogenetic toxin is furnished by a substance whose catabolism is incomplete. It is being prepared for elimination and the addition of a little more oxygen will finish the change and the substance will be carried away by some excretory organ. At this stage the natural process is checked by some cause, probably inefficiency in the group of glands, whose function is to control metabolism. Not being fitted for excretion, the substance is not cast forth from the organism, but is carried backward by the circulating blood. None of the organs can make use of this partly catabolized matter; so being misplaced and useless, it does harm; it disturbs the normal equilibrium and becomes a histogenetic toxin.

Although the complex and subtle processes of metabolism take place in our own bodies, they are wholly beyond the scope of our consciousness, as long as they proceed normally. When disorder occurs, when the natural equilibrium is disturbed, then there are symptoms which warn our minds that hostile forces are making attacks by which health and life are endangered. Pain, which we dread and deprecate, is often a friend, giving signals of the inroads of disease, at an early stage, when the enemy may be successfully resisted. In many cases irreparable damage would have been done, if pain had not arousd our intelligence by a prompt alarm.

The symptoms of auto-intoxication are ushered in by a general sense of discomfort throughout the abdominal region. There is a feeling of constriction at the waist which becomes greater as gas accumulates in the intestines. There are eructations from the stomach of a sour and sometimes acrid character and flatus of disagreeable odor escapes from the anus. There is constipation, or diarrhea, or an alternation of the two; the feces being frequently expelled with considerable force and presenting a lumpy, curdy aspect. This matter is quite often very acid in reaction irritating the skin and mucous membrane of the anus. Defecation is preceded and accompanied by pain, often centered at the umbilicus or navel and described by the sufferer as "twisting." Besides this there are intermittent attacks of pain near the cecum and appendix and in the intervals of acute suffering, a nearly continuous dull ache. Patients speak of "feeling sick all over," and with very good reason.

When the condition becomes chronic, symptoms of a general character appear. Patients are commonly pale, sallow and anemic, though occasionally of plethoric appearance. They are often melancholy and neurasthenic, subject to spells of depression with pains in the back of the head and neck and attacks of vertigo. The so-called "kidney-pain" in the small of the back is pathognomonic of gastro-intestinal putrefaction and auto-intoxication.

The disordered metabolism gives rise to many disturbances of the circulation and patients frequently have a fixed impression that they are suffering from heart disease. Palpitation especially in the morning and evening is a very common symptom. As a rule, the pulse is hard; rapid when the stomach is empty and slow after eating, a change which seems to be due to splanchnic congestion. Intermission of the pulse and other forms of cardiac arhythmia are frequent and are sedulously observed by the patient, increasing his psychic depression. There may be transitory albuminuria and even brief periods, when tube casts appear in the urine. Indicanuria is constantly present. The liver is sluggish and when there is arterio-sclerosis, as there often is, it may become cirrhotic. Boix has shown, by animal experimentation, that butyric and valerianic acids, indol and skatol can produce severe cirrhosis of the liver and that catarrh of the intestines favors the formation of these substances. Eczema, pemphigus and herpes zoster are cutaneous affections which belong to the symptomatology.

Subjective ocular phenomena are very frequent, such as flashes of light before the eyes, floating specks (muscae volitantes) and an impression of waves of heated air rising from the ground. There may also occur iritis, choroiditis, chororetinitis and even retinitis, with yellow blotches on the choroid and puffiness of the vessels as well as involvement of the ocular muscles, as has been observed by deSchweinitz and others.

The diagnosis of auto-intoxication is not difficult, if the symptom complex be carefully studied and the patient systematically examined. This disease has been mistaken for appendicitis and operations performed, which were both useless and detrimental. Some twenty years ago, when it became known that appendicitis was much more common than had previously been supposed, many surgeons took an extreme view and attributed to disease of the appendix almost every pain, which was felt in the right iliac fossa. Now toxins often cause pain in this region, as has been noted above, and these may be of pronounced character, without indicating disease of the appendix. Such pain is no justification for opening the abdomen, unless there are present other symptoms and physical signs pointing to the existence of appendicitis.

Auto-intoxication is often confounded with rheumatism. True rheumatism is a distinct, infectious disease with a well marked pathology; but lumbago and the other myalgias, termed muscular rheumatism, are produced by enterogenous or histogenetic toxins. Lumbago is always due to these causes, except in the cases where it follows traumatism. It is an extremely frequent symptom and can be relieved by a course of disintoxication treatment and then reproduced at will by a diet rich in purins and productive of fermentation.

In estimating the damage done by the toxins, indicanuria becomes very significant. Indican in small amount is a constituent of the normal urine; but its notable increase is of great importance from the pathological standpoint, as it indicates seriously disordered metabolism. In examining urine the majority of physicians look for albumen and sugar only; very few make any effort to learn whether indican is present in an abnormal quantity. Doubtless many practitioners would avail themselves of the diagnostic help given by knowing the proportion of excreted indican, if they were familiar with a practicable and simple method for its determination. Such a method is supplied by Jaffe's test, which is easily made and is sufficiently exact for clinical purposes. The procedure is as follows: Mix equal parts of urine and strong hydrochloric acid and add a little tincture of the chloride of iron, as an oxidizing agent, and also a few minims of chloroform. The indican is converted into indigo blue, which is dissolved by the chloroform, giving the solution a blue color. The depth of this color is an index to the amount of indican present and can be compared with a strong, blue Fehling solution, as an indicator. The hue varies from an extremely faint blue in normal urine to a deep indigo when indican is in great excess, showing morbid changes of a serious character. This test thus indicates the severity of the disease and it also measures the benefits of the treatment applied, the color growing lighter progressively, as the patient's condition improves.

Prophylaxis of auto-intoxication includes all efforts to obviate the causes, both exciting and predisposing. Among the latter are some which may be congenital, like inherent weakness of the gastro-intestinal canal or hypothyroidism; some which are structural, like dilatation of the stomach, pyloric stenosis, gastroptosis, enteroptosis and sacculation of the intestines; but the great majority arise from the dietary and habits of the individual. The train of causation may start in infancy. The mother, who neglects the sacred duty of nourishing her child and instead gives it a bottle filled with some artificial food, or an ill-advised milk-combination, often lays the foundation for years of suffering in after life. Among both children and adults, hurried eating with no proper mastication or insalivation of the food is a very prominent predisposing cause, weakening the digestive apparatus, so that it yields to attacks, which it could otherwise resist. Lack of exercise, sedentary habits and constant indoor occupation, reduce the standard of vitality. A bad pre-eminence must be assigned to gormandizing both in food and drink at suppers, after the theater, and other social functions, where people partake freely of strong wines, highly seasoned dishes and indigestible mixtures, which they may or may not relish; but eat for the sake of good form. It is a curious anomaly that respectable and usually sensible people will persist in indulging in these social functions and in eating things, which they really do not want, simply for the sake of staying in the social world and for fear of the bantering and criticism of their acquaintances. Many men and women continue these habits of eating and drinking, although they well know the price in suffering and disability they must pay later; but rather than act differently from their companions stubbornly persist in injuring their health and shortening their life. Overloading the stomach is a prolific source of gastrointestinal trouble, as the digestive organs are taxed beyond their capacity and the residue of food putrifies and produces toxins. Rational people should realize the enormity of the mistake that is made when the stomach is loaded with a conglomeration of foods, which singly might be harmless; but which, when mixed together, undergo chemical changes that render them not only useless, but dangerous.

It is really not difficult to be abstemious in one's mode of life, as with any reasonable being a desire for health and long life should be sufficient to counterbalance any small enjoyment that is obtained from overindulgence in eating or drinking, which we know is destructive of our health and vigor.

The discussion of prophylaxis by forming the habit of eating moderate quantities of simple foods merges into consideration of the diet to be prescribed for those already suffering from the disease. The same principles apply to the preventive and to the curative treatment. The chief dietetic indication is to diminish the nitrogenous putrefaction. The organic compounds called purins are objectionable and hence the dietary should exclude livers, kidneys, sweetbreads, goose, duck, dark meats, salmon, shad and other rich fish. There is also objection to smoked and salted meats and fish, to those that are potted or spiced and to compounds and mixtures, such as the complex salads, a class of aliments, which impose a strain upon even a vigorous digestion. The foods permitted are best cooked by stewing, roasting or broiling. The selection for the nourishment of each patient cannot be made by routine; but must take into account individual peculiarities, which can be learned only by experience.

Pawlow and his associates made researches concerning the salivary, gastric and intestinal glands, which showed the great influence upon their secretions exerted by the psychic impressions produced by the special senses. The odor of meat, for instance, causes a gland to put forth a certain kind of secretion, while the odor of fats and starches will induce a different secretion from that same gland. Acting upon this suggestion, the author has for several years made a practice of instructing patients with hyperacidity to begin a meal with bread, butter and potatoes, or plain boiled rice, and to have meat kept out of the reach of sight and smell, until a portion of the fatty and starchy foods has been eaten. By this procedure the amount of acid secretions is perceptibly lessened. When acidity is too low, the order is reversed and the meal commences with meat. A very perceptible increase in the secretion of acid is observed to follow this sequence of foods.

Muscular exercise in the open air is important for its effect as a constitutional tonic. Most people will not make use of their muscles for the sake of health; but must have some incentive in the form of sport; the ambition to win some kind of game; therefore, recourse may be had to golf, tennis and similar pastimes, which do not necessitate strenuous effort. These exercises are to be encouraged only so long as they are mild, for over-fatigue is a distinct detriment and exhaustion very harmful.

Bathing may prove a useful adjunct in the treatment, as excretion from the skin supplements and, in a measure, substitutes the work of the other excretory organs. No general plan can be outlined; because the essential thing in balneotherapy is to adapt the remedy carefully to each individual case. It is the failure to do this, which has made the employment of baths so much less successful in this country than in Europe.

The disintoxication treatment devised by Guelpa is of great value, when there is extended intestinal putrefaction. The method, which is thoroughly rational, is to withdraw all food for three or four days, instructing the patient to drink water freely, and to take a large draught of a saline cathartic or of castor oil each night. This causes a very free purgation at least once daily. The patient does not suffer from hunger and experiences little weakness and no particular discomfort when the thorough evacuation of the bowels occur. Enormous quantities of bacteria are killed by starvation and washed out by the flushing of the alimentary canal. The procedure also leaves the intestines in a state more susceptible to subsequent treatment, and when followed by Bulgarian lactic acid bacilli either in the form of buttermilk or tablet, much benefit may be expected if continued for sufficient length of time.

Lavage is frequently useful, particularly where there is stenosis of the pyloris and dilatation of the stomach. It is advantageous to wash away fragments of decomposing food and mixed ferments kept in the organ too long after secretion; but lavage must not be carried to excess.

It has been shown by Steele and others that to render the intestinal canal actually aseptic is an impossibility; because the surface upon the interior of the tract is of such great extent, that the destruction of all germs would require antiseptics in doses so large as to prove fatal. The hope of finding a medicine which will disinfect the whole alimentary canal has not been realized and is not likely to be; nevertheless there are remedies producing a partial asepsis and which should not be neglected. One of these is castor oil. It carries downward large quantities of the bacteria and appears to inhibit their reproduction. To be efficient it must be given freely and this can be done with safety. The salicylate of bismuth and the salicylate of magnesia contribute much to intestinal asepsis. Bismuth should not be given as a dry powder, nor in capsules. It is best administered by stirring twenty grains of it into a gobletful of water, the mixture to be drunk an hour before eating. Given thus suspended in water, bismuth forms a very thin coating upon the mucosa of the stomach and intestines, and this film checks the multiplication of microbes and also the excessive production of mucus. The nitrate of silver has been clinically proved to possess some therapeutic value: it should be given in dilute solution preferably an hour before, or two hours after meals. The biliary salts, which have a natural antiseptic function in the organism, have shown themselves useful remedies, especially in cases where vertigo is a prominent symptom. When in the course of the disease there occurs a condition of hyperacidity, or its opposite anacidity, these departures from the natural balance should be corrected by diet as described above or by administering acids or alkalies and the choice can be made among the large number available, so as to meet the specific needs of each individual patient.

In the treatment of auto-intoxication, organotherapy holds a place of steadily increasing importance. It must be noted that the remedies so far mentioned are used with the intent of getting rid of the substances causing the disease; of eliminating the bacteria and the noxious products, which the bacteria have created. The purpose of such treatment is detergent, cleansing: it presents one side of the therapeusis; but there is another side. After the enemy is expelled, there is need for restorative, reconstructive work; the damage wrought must be repaired and the organism must be defended against future attacks.

For this part of the treatment we must depend upon the potencies of the ductless and allied glands, which control the processes of metabolism in both its aspects. The ergonisons elaborated by these organs, when produced in adequate quantity, repel many of the toxic assaults, and when the defense has failed and damage has been done, they enable the organism to affect repairs and to resume its healthful state. To make good deficiencies in the supply of the ergonisons, we must furnish a fluid as nearly as possible identical with them and it must enter the circulation directly and unchanged. These conditions are fulfilled by the intramuscular injection of the polyglandular solution described in Chapter 4. It supplies the constructive factor in the method of treatment. It is not a specific; a sure cure in every case. No such claim is made on its behalf; nor is it proffered as a single substitute for all other forms of treatment. Far from this being so, there is room and need for hygienic, dietary, instructional measures, together with mineral and vegetable medicines: in this warfare we want the help of all arms of the service. The polyglandular solution does not displace other remedies; it coöperates with them: they pursue the germs and antagonise them; it acts from within, energizing forces in the most intimate recesses of vitality. Working in ways impossible to other remedies, it attains results they could not reach and the inherent powers of the organism are aroused to respond to medicinal aid extended from without; so that all the curative forces act in unison.

This latest addition has rendered the whole scheme of treatment comprehensible and rational and, although its adoption is but recent, has already greatly improved the prognostic outlook for sufferers from auto-intoxication.

CHAPTER VII.

NEURASTHENIAS.

Neurasthenia has become one of the most prevalent diseases, if in fact it be a distinct disease rather than a combination of symptoms due to a general disturbance of metabolism. Etiologically it may be divided into primary and secondary neurasthenia. This distinction is very important from the standpoint of treatment, as, if it be not made, a case may be treated as primary, which, in reality, is secondary to an organic disease which should be recognized and properly treated and the neglect of which is a grave error. Primary neurasthenia is comparatively rare and, being dependent upon prenatal influences, is congenital. It is much more frequent in females than in males. The secondary form is very common and is encountered by every practitioner of medicine. It is by no means confined to the wealthy and those in the upper ranks of society, so-called; but is met with in all walks of life and among all classes. It is more prevalent among women than men.

Neurasthenia is very hard to define. By derivation the word signifies "nervous weakness," and this is certainly the popular conception of the affection. To the physician it indicates groups of symptoms covering a wide range. In mild cases the most noticeable thing is an abnormal sensitiveness, which responds too rapidly to stimuli, passes too quickly into the reaction of depression and shows fatigue upon slight mental or physical exertion. From this slight ailment there is a long gradation to those grave conditions characterized by mental aberration, emotional obsessions, hypochondriasis and manifestations on the border line of insanity.

No pathological changes in the organs or tissues have as yet been found associated with neurasthenia; but that does not prove that none exists. It is probable that the alterations taking place in the course of the disease are chemical rather than structural. It is a mooted question, whether there are changes in the cells of the brain or medulla, causing them to respond abnormally to stimuli caused perhaps by morbid processes in the ductless and other glands, which cause their products to act toxically upon the nervous system; or whether there is a lack of power on the part of the ductless glands to elaborate their ergonisons, which normally are antidotes to poisonous products of catabolism and bring about their complete oxidation and elimination. To the author the latter appears to be the correct theory. The correct explanation of the diverse forms in which the disease makes its appearance may be, that there is weakness of the entire organism, on account of which, the cells can resist strain only to a degree far below what is normal, and as one organ or system of organs breaks down first, the initial symptoms will be referred to that organ or group of organs. The opinion is becoming prevalent, especially among laymen, that neurasthenia has no physical basis. This is a very grave error; but it must be admitted that mental or emotional stimuli, either in themselves abnormal, or excessive in degree, though normal in kind, may cause physical symptoms; or even ultimately structural lesions. In this sense, neurasthenia may properly be called psychasthenia.

Among predisposing causes of this disease are specific taint, a sedentary life, unhygienic surroundings, over-exertion either in work, or in the pursuit of pleasure and excess in eating, drinking, or sexual indulgence; but a leading part in causation must be assigned to bad education, to perniciously wrong training in two most important things; sexual functions and relation of personal rights to social duties. Wrong habits of thinking and acting formed early in life are prolific sources of the worst forms of neurasthenia and also of the criminal types of insanity.

The exciting causes which make the latent weaknesses apparent and bring the patient under medical treatment include shocks, either traumatic or emotional, too early getting up after surgical operations, debauches of any sort; in a word, whatever puts a sudden strain upon an organism which is already asthenic, though the weakness may to a considerable extent be latent.

The symptoms of which patients usually complain are mental and physical depression hindering work with either body or brain, insomnia, melancholy and morbid introspection. Gastro-intestinal disorders are often present, especially hyperacidity and constipation. Sexual apathy and impotence are frequently prominent symptoms. There is never a true paralysis; but a sense of muscular weakness often accompanied by tremors of the hands and mouth. The emotions are variable; depression one day followed by buoyancy the next, neither referable to a rational cause. The special senses are easily fatigued and vertigo is common, particularly when there is gastric disturbance. There is often headache and pain in the back of the neck. In many patients there is constant apprehensiveness of danger and a consequent timidity while usually the will power is conspicuously weak. This volitional feebleness shows itself in lack of self-control with absence of courage to attempt what is difficult or dangerous, and absence of fortitude to endure pain or misfortune.

Prevention is better than cure and nowhere does a wise prophylaxis accomplish better results than in this connection. Neurasthenia could be made a rare disease, if proper prophylactic measures were undertaken early and followed with perseverance. The most important measure is a rational, judicious training of the child and it cannot begin too soon. Parents, teachers and clergymen can do much to mould the the minds and bodies of the children under their care: much to fortify the nervous system, so that it can resist assaults made upon it in after years. This is a truth which cannot be given too much emphasis. Unfortunately many of those who rear children, instead of strengthening them nervously and psychically, actually use their great opportunities to weaken and undermine; so that the child deteriorates in their hands and reaches maturity in a more unbalanced condition than the neglected, ill-used gamin of the streets. Of course this irrevocable injury is not inflicted *intentionally;* but the damage is done, just the same.

Fussy solicitude and meddlesome interference start with the infant. Doting parents and grandmothers, who are irrationably over-anxious about the wants and comforts of babies, do them great injury by habitually picking them up and trying to amuse them by shaking rattles and bright objects to attract the attention, when what the child most needs is quiet and sleep. When babies cry, they are stuffed with food or carried around in the night, supposedly to soothe them, when in fact they have cried to exercise their lungs, a perfectly proper thing, which should not be interfered with. The unspeaking infant has no other means of expanding its lungs than by crying and within limits it is a natural normal act which causes full inflation of the pulmonary vesicles: when that is accomplished the crying ceases. The wails due to misplaced pins or pains of any sort are easily distinguished from the functional cry to which we here allude.

When the children are a little older, all their fancies and whims are indulged, until they come to think (and very naturally) that every desire must be at once gratified, and if obedience to their commands is tardy, they fly into a paroxysm of rage; which brings more coddling and still greater indulgence. This wretched mis-training is continued, through childhood and adolescence and its natural product is a neurasthenic, or a paranoiac. Such abnormal youths are becoming very common in the families of our well-to-do citizens who, although most of them had in their own youth the discipline of industry, economy and obedience, have reared their children to think themselves superior to other mortals and exempt from obedience to laws of any sort. These young men of gilded dross utterly disregard the rights of others. Already sated and blase, their chief occupation is to search for some new sensation and in the quest, they are wholly indifferent to the safety and even the lives of their fellow-men.

The fatal omission in the education of such young men is the lesson of obedience; its place cannot be filled by all that schools and books can teach. Obedience to the rightful authority has been a prominent trait in the great characters of history: it was conspicuous in Abraham Lincoln, who embodied the noblest aspirations of the American people. One of his eulogists gives this virtue the crowning place in the great patriot's character:

"Brave to endeavor and strong to endure;
Honestly proud; not ashamed to be poor;
Upright, outspoken, despising all stealth;
Counting fidelity better than wealth;
Patient in working with brain and with hand;
Trained in obedience, ere called to command."

Next to this comes instruction regarding the sexual organs and functions and this should be given faithfully by all entrusted with the education of the young, though the chief responsibility rests upon parents. The prudery, deception and false ideas prevalent upon this subject constitute one of the greatest evils and perils of our age. Many a parent fails to perform his duty, because he takes a mistaken view. He says to himself: "Shall I explain sexual facts to my son, at his present tender age, taking the risk of being misunderstood and perhaps losing my boy's respect; or shall I for the present, leave him in the innocence of ignorance and postpone this instruction till he is in his teens, when his more developed mind will be better fitted to receive it?" The father chooses the second course and leaves the matter dormant, until some day he has a rude awakening, which comes too late. No such alternative is presented to parents. The matter will not wait. Not one boy in a thousand reaches the age of puberty in the "innocence of ignorance." In boyhood curiosity is intense and the lad is sure to be taught. The real alternative before the father is this. "My little son will very soon learn sexual facts:

shall he learn them from me; or from the foul-mouthed big boy at the school; the obscene stable man; or (Heaven forbid!) some unspeakable depraved creature, who lurks around to find boy victims?" When parents awaken to the solemn gravity of this question, both health and morality will take a long step forward. Under proper instruction, proper habits will be formed, sexual perversions will become rare and we shall have a race of people better and stronger, physically, mentally and morally. If the early years of life are lived chastely and normally a good foundation will exist for the proper appreciation of the duties and privileges belonging to the married state and the health and happiness of wedded life will be greatly augmented.

The occurrence of these beneficent changes will make a marked decrease in neurasthenia; for while the disease is not always of sexual origin, the proportion of cases in which there is a sexual element in the etiology is very large.

To attain the desirable results referred to, the only way is judicious instruction. When the child is ten years old, or as soon as his curiosity is aroused by the phenomena of the transmission of life, his inquiring mind should be honestly and frankly informed and these wonderful phenomena explained in a chaste and rational manner by his parents. This can be done by using the vegetable kingdom, the structure of flowers, etc., as illustrations, without shocking the child, and the lesson can afterward be repeated and amplified so as to include animals and man in a perfectly natural straightforward way. Information so imparted will be received in very much the same frame of mind as the child has toward physiological teaching regarding sight, hearing, or the digestion of food; because the two dangerous factors are wholly eliminated. The child's notion that the subject is mysterious and evil brings in the sinister element, with its dire consequences of concealment from parents, whispered interviews with corrupting companions, shame of innocence and pride in forbidden knowledge. When in later years the lad hears sexual matters discussed by other boys (and this cannot be prevented) he will not be astonished or startled; but will hear the "twice told tale" with the mental comment, "Oh, yes, father explained all that long ago."

Though the masculine pronoun has been used in this discussion, it has been in the generis sense; for the matter is of equal importance to both sexes and proper instruction is as necessary for girls as for boys.

In pointing out the prophylaxis of a disease, the physician diminishes the number of such people and, by so doing, reduces the opportunities for professional work upon which his own livelihood depends. In such altruism he stands alone in all the world. His duty to the present sufferers from neurasthenia is to give them the best attainable treatment. Such treatment is partly psychical and partly physical. Under the first head comes suggestion, which has been used in many ways and by many sorts of people, doctors, clergymen, metaphysicians, quacks, *et al.* "Christian Science" should be mentioned in this connection, as its successes have been mainly among neurasthenics, free from organic lesions, who had ridden their hobby so long as to develop a certain volitional force strong enough to overcome their imaginary or purely functional ailments. Let not the physician make the blunder of trying to parallel these cures in patients, who lack this volitional force by harshly telling them their disease is fanciful and they can return to health by exerting self-control. He will fail badly. Many such a patient knows quite well that she has no self-control to exert and that its absence is the essential factor in the illness, which brought her to the doctor to be helped; not to be rebuked. Hypnotism has been useful in some cases; but is a dangerous remedy and has often induced mental conditions worse than the original affection. Travel, change of scene and of occupation have proved useful in this, as in many other chronic diseases, by acting as psychic tonics and they are safe remedies; but, of course, limited to the small percentage who can afford them.

Turning to the physical aspect of treatment, the first point to be considered is nutrition. Disorder of the gastro-intestinal tract is very common in neurasthenia, of which it may be the cause (exciting) or the result or the two may travel in a vicious circle. The patient's diet must be planned to meet the individual peculiarities, while keeping in view certain general principles. The following articles are usually contra-indicated: soups, broths; fried, salted or preserved foods; pastries, sweetmeats, and acidulous articles, such as pickles. If analysis of the urine shows an excess of indican, both eggs and meats should be avoided. Barring this objection, flesh foods may be taken moderately and white meats are preferable to the red. Whole milk is valuable if the stomach digests it well. Buttermilk is often very useful, because it limits fermentation and putrefaction in the intestinal tract. The object in view is to supply a diet which will prove for the particular patient under treatment nutritious without being stimulating. The problem must be worked out for each case; routine practice will not do. The custom of indiscriminately ordering a diet of eggs and milk is absurd and, when contra-indicated, these aliments do a great deal of harm.

Bathing is an important remedial measure when intelligently used. It is much more esteemed among physicians upon the European continent than among us and they achieve results which astonish us. That we have much less success in balneotherapy is wholly because it is used in a sort of haphazard way, one man having a preference for hot baths and another for cold; or for some special form. No success can be expected from such a course. The exact indications in each case must be determined and then that sort of bath selected which will fulfill these indications. There should be as much accuracy in prescribing a bath as in prescribing opium or nux vomica.

The "rest cure," as it is called, was devised by Dr. S. Weir Mitchell, of Philadelphia, and was used by him primarily in the treatment of his neurasthenic patients: it has since been taken up by many others and used, or abused, in a multitude of diseases, to many of which it had no applicability whatever. The idea underlying the rest cure is to give the patient the benefits accruing from muscular exercise without the weariness attendant upon voluntary use of the nerves and muscles. The patient's will power is passive; the volitional work is performed by the nurse and other attendants. This treatment is of great value when the patients are judiciously selected and when it is faithfully carried out in full detail; otherwise it is worth very little. It is applied to the best advantage in a special hospital, or sanitarium, where the physician's orders are obeyed in both letter and spirit. A great deal depends upon the nurse, who should be broad-minded, sympathetic, tactful and firm; for the patients who can take this treatment come from a class accustomed to self-indulgence and their illness has accentuated their tendency to be selfish and domineering. The nurse must have the ability to maintain control without being harsh and must learn how to influence the patient's mind so as to secure her full coöperation in making the treatment efficient.

The number of drugs, which have been employed in neurasthenia, is legion. Their use has not been attended with great success and this is not strange, for they were unable to do more than influence some of the many factors, constituting the symptom-complex. They acted in a superficial way and nothing more could be expected; for treatment could not be addressed to the radical cause of the disease, so long as that cause was unknown. Where excitement was a prominent symptom, the bromides, valerian and sumbul proved of advantage; iron did good in anaemic cases and nux vomica in the asthenics, especially when there was anorexia. Phosphorus in its various compounds had for a while many advocates, largely from the theoretical view that this element was the mainspring of nerve force; but clinical experience did not sustain the high claims made for it, though it benefited certain patients. Alcoholics should be prohibited and opium is contra-indicated, because neurasthenics are peculiarly liable to become addicted to the use of stimulants and narcotics.

Organotherapy has become an important factor in the treatment of this disease since it has been recognized that the ductless and sexual glands play a leading part in metabolism (See Chapter 5). For several years past, the author has been employing for this purpose his polyglandular extract, described in Chapter 4, and the results obtained both among his own patients and among those of his colleagues, to whom he supplied the solution for the purpose of therapeutic study, have been indeed remarkable. The solution shows a restorative influence upon the equilibrium of the glandular group, sometimes called the adrenal system, and also upon the equipoise of the cerebro-spinal system, and this influence does not cease with the withdrawal of the solution. In the author's hands no other remedial agent has had nearly such satisfactory results and this clinical experience, together with physiological research, has led him to believe that the primary disorder in neurasthenia is a disturbance of the ductless and sexual gland system. This disturbance soon gives indications that the ergonisons of the glands are not performing their functions in a degree sufficient to maintain the normal balance of vital activities, and there ensues a long train of phenomena, which are in reality hypo-functional manifestations. The administration of this solution representing the ergonisons begins at once to supply the deficiency and, when the supply becomes adequate, all the functions improve and the patient is on the way to health.

The solution has now been used in nearly four hundred cases of neurasthenia and in every instance with favorable results. A few illustrative examples are subjoined.

Neurasthenia and Melancholia:

September 5, 1912.

Case No. 1. Age 66, occupation station agent. Family history. Mother died of chronic diarrhea;

father of Brights; two brothers of T. B. Otherwise negative. Previous history. Never sick, except a little lumbago (which shows a state of auto-intoxication). Present condition. Asthenic, nervous, has vertigo; bowels move every day, but not of proper formation; either mushy or of small caliber or scibila. Appetite and digestion good, though suffers from flatulency two hours after meal. Sleeps good. Never very strong sexually, and at present entirely impotent. Injections three times weekly for two weeks, then twice weekly for two weeks and then once weekly for four weeks. Asthenia entirely disappeared; vertigo gone and sexual power very markedly improved.

March 14, 1913.

Case No. 2. Age 64, occupation superintendent; out of door work. Married 42 years, five children. Family history good throughout. Previous history. Ordinary diseases of childhood; gonorrhea at 15 and syphilis at the same age. In 1886 had asthma and bronchitis; lasted until 1908. Present condition. Asthenia, anorexia, constipation, nervous, insomnia and impotency. Injections daily for four weeks; after third injection noticed better control of nerves and more restful sleep; after two weeks appetite improved, bowels normal, strength good and erectile power much improved. After four weeks says he feels as good as he did at 25 years of age. No nervousness, no asthenia, bowels regular, sexual power up to par.

March 31, 1913.

Case No. 3. Age 55, occupation chemist, widower. Family history negative. Previous history. Ordinary diseases of childhood, peritonitis at 15 following appendicitis; gonorrhea at 20, always inclined to have flatulency and hyperacidity. Severely burned with acid at the age of 44. Large quantity of acid deluged him from head to foot, almost causing his death. Present condition. Asthenic, easily tired, nervous, very restless, chorea of hands and legs. Difficulty in concentrating his mental powers; appetite fair, digestion poor, bowels constipated, impotent. Injections twice weekly for three months. After first six injections his chorea-form movements subsided and disappeared entirely after tenth injection; slept better and more restful from first injection; appetite improved; general vitality and power of mental concentration normal. Sexual tone restored, and considers himself in perfect health.

Case No. 4. Age 36, occupation fitter. Family history: Grandparents from both sides died of paralysis; paternal uncle died of T. B.; otherwise negative. Previous condition: Measles and scarlet fever in early childhood; jaundice at 10; diphtheria at 12 years of age; grip several times; cystitis two years ago. Present condition: Subject to nervous headaches for seven years, worse at menstrual periods; easily excited. Sleeps fairly well, but has bad dreams and awakes with a start. Appetite variable, indigestion, fullness after eating, eructations of gas; constipation, pain in back of neck, feeling of impending danger; inclined to worry. Weight 103 pounds. Treatment: Injections twice weekly for three months; general symptoms markedly improved; appetite good, sleeps well without troubled dreams; sense of fear gone. Weight 118 pounds.

August 10, 1910.

Case No. 5. Age 19, occupation clerk. Family history: Father died of Bright's at 60; sister of T. B.; otherwise negative. Previous history: Pneumonia at 9; good recovery; otherwise negative, except for persistent masturbation for a number of years. Present condition: Asthenic, nervous, lumbago and pain in the back of neck; lost 15 pounds in less than a year. Appetite good; digestion poor; eructations of gas after meals; constipated; sleeps good. Nocturnal emissions about once a week; erectile power poor; difficulty in concentration; sense of impending danger and inability to perform his daily work properly. Injections twice weekly for two months. Noticed distinct improvement after the first injection; mental condition vastly improved; power of concentration good; appetite good; sleeps well; erectile power normal. Has had no emissions for six weeks; discharged. Exhibited before members of the Philadelphia County Medical Society, March 27, 1913.

January 10, 1913.

Case No. 6. Neurasthenia and obesity. Age 55; married; two children; weight 200 pounds. Family history negative. Previous history. Ordinary diseases of childhood; rheumatism in arm and hand, and lumbago; no other sickness. Present condition. Appetite fair; bowels regular; sleep variable; tissues very soft; extremely nervous; short of breath on exertion; unable to walk without assistance; has tendency to fall forward and has much trouble in getting in and out of street cars and going up and down stairs; melancholic; complexion lardy; face wrinkled. Injections twice weekly for three months; weight reduced to 152 pounds, nerves steady; sleeps well; appetite good; able to walk and dance without difficulty; goes up and down stairs lightly; her complexion good and looks ten years younger.

Case No. 7. Age 38, married; two children. Family history: father died of arterio sclerosis; otherwise negative. Never sick enough to be confined to bed, but always nervous. Weighs 150 pounds. Headache, neuralgia; although very remarkably well developed muscularly, tires easily; subject to spells of despondency and fits of anger. Injections once weekly for three months and regulated diet. Nerves steady, temperament improved; not irritable; able to do more mental and physical work with less fatigue. Expresses himself as feeling up to par.

April 24, 1913.

Case No. 8. Age 44, occupation physician; married, one child. Family history. Father has peculiar mental condition which has never been accurately classified; a distinct neurotic taint throughout the entire family on both sides. Previous condition. Ordinary diseases of childhood; pneumonia at 12. Fourteen years ago was placed in a sanitarium, treated for insanity. Violent at times. Present condition. Extremely nervous; asthenic, insomnia, anorexia, melancholia; impotency. Injections every day for one month; then three weekly for one month; two weekly for one month and once weekly for one month. Nervous condition improved after the first month. Up to that time patient was thoroughly discouraged and expressed himself as being hopeless and incurable. After that, slight improvement was noted; asthenia disappeared; insomnia became less; patient became less irritable; appetite improved, general aspect less dejected and more hopeful. After four months' treatment patient returned to his practice in perfect self-control and is free from previous symptoms. His erectile power has returned.

September 9, 1912.

Case No. 9. Age 57, occupation mechanical engineer; married twenty years, no children. Family history. Mother operated on for cancer at 67; otherwise negative. Previous history. Ordinary diseases of childhood, scarlet fever at 7; gonorrhea at 27. Present condition. Since last November has been nervous and asthenic; has had difficulty in concentrating his mental powers; has been irritable and unable to sleep owing to excessive mental exertion; also impotent. Appetite good, bowels regular. Has important work to do and begged for relief to prevent interruption. Injections three times weekly for three months. Experienced distinct sensation of exhilaration after sixth injection. Sleeps well, concentrates well and is able to indulge in most arduous mental labors.

April 3, 1913.

Case No. 10. Age 49, occupation superintendent of schools; married twenty years; two children, older 17, younger 8. Family history negative. Previous history. Ordinary diseases of childhood, was a frail child; typhoid at 5; always asthenic and nervous. Present condition. Asthenia, melancholia, mental depression and sexual excitement, slow cerebration, lack of power to concentrate, lumbago, vertigo, peculiar sensation in feet and legs, very sensitive to noise; has frequent seminal emissions which produced very profound depression, lasting several days. Riding in the street cars produced sexual excitement, followed by great depression both mental and physical. Diagnosis, sexual neurasthenia. Injections twice weekly for three and one-half months. After first two weeks the mental attitude was distinctly better, considerable sense of buoyancy developed; seminal emissions were less frequent, and sexual power, which was poor before, was increased. Was able to perform his duties with considerable more ease. After three months his general nerve tone and mental vigor had entirely returned.

December 21, 1912.

Case No. 11. Age 32, occupation salesman, single. Family history. Father died of diabetes, age 62; mother living; otherwise negative. Previous history. Ordinary diseases of childhood; typhoid at 13, grip ten years ago; gonorrhea four years ago. Present condition. Nervous, asthenic, power of concentration poor, lacks efficiency to perform labors of his occupation; unable to concentrate upon a subject when talking, which interferes with his ability as a salesman. Sleeps poorly, lacks vitality and efficiency; nerve force below par; appetite good, digestion good; bowels good; partial impotency; subject to spells of depression. Examination. Unusual muscular development (formerly athlete, oarsman). Injections twice weekly for eight weeks, then once weekly for four weeks. Nerve tone and mental efficiency greatly improved; able to return to his occupation with old-time vigor.

Case No. 12. Male, aged 30 years, banker. Has insomnia, lack of power to concentrate attention, inability to add long columns of figures. Received two injections a week for one month, at the end of which time his mental condition was improved. He was able to concentrate his attention and do his work in a normal way. His appetite and bowels were normal.

Case No. 13. Female, aged 39 years, had neurasthenia, anemia, constipation, anorexia, headache, insomnia, suicidal tendencies. Hemoglobin 70 per cent.;

red corpuscles 3,400,000; white 7,500. Injections were given twice weekly for six weeks, when appetite and bowels had become normal, hemoglobin was 95 per cent. and red corpuscles were 4,960,000. She sleeps soundly and has a marked sense of well-being.

Case No. 14. Female, single, aged 55 years, had pale skin, deeply lined face, cheeks hanging in pouches, anemia, anorexia. She received injections twice weekly for four weeks; then once weekly for three months; at which time she showed distinct improvement in nervous and digestive symptoms, with brightened eyes, plump cheeks, looking twenty years younger and saying she felt as well as when a girl.

Case No. 15. Aged 45, a great society woman, whose ill health was due to excessive social indulgence. She had a pallid complexion, dark lines under the eyes, a wrinkled skin, sunken and flabby cheeks; anorexia, constipation, restlessness, inability to concentrate her thoughts. Injections once daily for a month brought about entire recovery. This lady had formerly been accustomed to take a rest cure of several weeks every spring.

Case No. 16. Female, aged 40 years, was very obese, weighing 240 pounds. Constipation and anorexia were prominent symptoms and there was amenorrhea and melancholia with suicidal tendency. Injections twice a week for two months caused great improvement. She has lost forty pounds in weight, sleeps well, has a good appetite, normal pulse, regular menses and her nervous condition is very much better.

Case No. 17. Aged 39 years; married at 20; eight children; seven confinements. Family history is negative. Previous history. Ordinary diseases of childhood; operated on four times, the operations being two curettages, the repair of lacerated cervix (trachealeorraphy) and closure of lacerated perineum (perineorraphy). She began to menstruate at 15; from 19 to 20, when she married, the intervals were only two weeks; since then there has been irregularity, the flow lasting four days with some leucorrhea. Present condition. The patient is in a state of marked depression and much discouraged regarding her health. She said she had been seeking relief for sixteen years past and had been under the care of twenty-nine physicians, some of them the most eminent in New York and Philadelphia. Now she had no faith in doctors and believed she would never be cured. This is cited simply to show the tendency of this sort of patients to speedy discouragement and frequent change of physicians. Among the symptoms were recurrent headaches, anorexia, indigestion, constipation, flatulency and others pointing to intestinal putrefaction. She was asthenic, melancholic and subject to attacks of deep mental depression. Physical examination gave negative results. Treatment. Injections given twice a week. During the first month only slight improvement was noticed; after that the change was progressively favorable and in three and a half months the neurasthenia and melancholia had entirely disappeared and the patient was discharged as cured.

Case No. 18. April 9, 1912. Aged 33 years, bartender. Family history negative. Previous history negative. Present condition is one of extreme nervousness, depression and melancholia, with insomnia, asthenia, asthenopia, suicidal tendencies and capricious appetite. He has not been able to work for three years and can scarcely speak or stand on account of nervousness. Physical examination. Height 5 feet 8 inches; weight 165 pounds; muscular development unusually good; large scar on throat from ear to ear, made by razor in attempt at suicide during spell of melancholic depression. Injection of fifteen minims. Three days later (April 12) mental condition entirely changed; eyes clear and bright; patient feels strong and in high spirits. Injection of fifteen minims. On April 14th the patient says he feels 100 per cent. better and ready to go to work. April 17th, he expresses himself as feeling stronger than ever before. The nerves are absolutely steady. April 21st, he feels so well that he has accepted a position and gone to work. Cured.

The following cases have been reported by professional colleagues:

Dear Doctor: It gives me great pleasure to report the following case, which I treated with polyglandular extract (Starkey):

Case No. 19. Age 46, of Swedish nationality; by occupation hotelkeeper. Family history good throughout. Patient's health good until January, 1910. At that time he noticed that he tired from only moderate exertion; as he said, he seemed to have lost his ambition. He was losing weight, at this time, at the rate of a pound a week. He complained of a constant tired feeling in the extremities, but of no actual pain. Four weeks ago he stated that this weakness had extended to the sexual organs. Previous excessive venery was probably a strong etiological factor in the present trouble. After futilely using all the remedies I knew of, I put him on polyglandular extract (Starkey). He was given an injection in the gluteal region every second day for eight days, then an injection every fourth day for eight days, and finally one injection per week, until he had received eleven injections. No local reaction occurred. After the fourth injection he stated that he was feeling better, was regaining the strength in his limbs and did not tire so easily. After the eighth injection his sexual desire and power was normal. During the course of treatment he gained nine pounds. Three days ago he stated that he was feeling better than he had felt for the past ten years. He has been discharged as cured.

W. M. ATKINSON,
Dagus Mines, Pa.

Case No. 20.

Dear Doctor: The patient whom I put on your treatment has arterio-sclerosis and is certainly improving.

The first week's treatment has reduced the blood pressure over fifteen m.m. I am giving the extract daily and he is more than satisfied. He has agreed to continue until, in my judgment, he has had sufficient. Friday last I put on the treatment an aged patient of mine, who I really thought was dying, the first of the week, and she is showing remarkable improvement. I am satisfied that in a certain type of cases this is the only treatment that can give results. Next week I expect to put a Salvarsan case upon this as an after-treatment and note the effect.

G. W. GALVIN,
180 Huntington Ave.,
Boston, Mass.

Case No. 21. Attorney-at-law, 47 years old, always well until present illness. For several years engaged in the practice of law and in a promoting business of unusual straining character. When work had to be rushed he would stimulate himself, using large amounts of strong coffee during the late hours of the night, practiced cigarette smoking excessively and inhaled the smoke.

During this kind of life he was taken ill (fall, 1907) with mumps and not considering it necessary to stay in bed during his illness he shortly after got a severe orchitis sinistra, followed in the course of a few months by atrophy of the testicle, severe testicular neuralgia, sciatic neuralgia mainly manifest in left heel and along the course of nerve dorsalis pedis and sciatic. Some time in

1908 he first noticed that he was getting nervous. He became forgetful, lost his ability to concentrate his mind on matters of business; he even (repeatedly) would start out on a business trip to one neighboring town, and go to another where he had nothing to do. He would do other things in the same confused way. He would have crying spells and finally felt (about January, 1910) that he had to give up business. In the summer of 1910 he commenced getting spells of gallstone colic, the nature of which was not recognized before November, 1910; the operation I advised was not performed before June, 1911, and during the year preceding the operation his condition seemed extremely serious. He lost weight rapidly, the spells of pain were extremely hard, judging from the expressions he gave them; during the spells he would act almost insane, cry hysterically, throw himself, doubled up with pain, on the floor or in the bed or anywhere. He would be confused and towards the end of a spell he would go into unconsciousness and later into sleep. During this period (1910-1911) he seemed to have lost all traces of ever having been an unusual intelligent and refined person.

After the operation he seemed to recover for a while, but soon the neurasthenic condition which had been present before developed independently of the former condition. He felt unable to work, bodily and mentally, particularly unable to concentrate his mind on anything. If he exerted himself he would get into a half-conscious state in which "a great tightness and tenseness of brain and nerves" were his main impressions. This always ended in a collapse, coming on gradually through an increasing stupor. When waking up from his faint he would be confused, not knowing where he was or what had happened. When realizing, he would cry convulsively for a while, go to sleep, wake up next morning and feel, as he said, stupid all through the day.

While his strength seemed to improve some, he would give himself comparatively more work to do and consequently bring on the spells more and more often.

Naturally cheerful, he would be very much depressed during this part of his disease, realizing the apparent hopelessness of the case.

Bowels were constipated and laxatives almost without effect. During the whole time (1908-1913) he never had a feeling of a real natural desire to move the bowels or pass water. His abdomen (before the operation as well as after) was always extremely tense, retracted, hard as wood, with rigid muscles never naturally relaxed. Off and on a crop of small painful boils would show on his skin (neck or abdomen).

My treatment was symptomatic (including the advice of operation) and tonic, but excepting the relief from the gallstone colic, which followed the operation, entirely without effect.

In July, 1912, after reading your article in the New York Medical Journal, I commenced giving hypodermics of adrenalin (0.45 c.c. of a 1 per cent. solution), thinking that it might have some of the same effect which your article claimed for your polyglandular extract. I gave one injection every five or seven days and for a short while after each one he would feel better. As I wanted to raise his blood pressure (always 115-120 with a hemoglobin of 85 per cent.) I used pituitary gland in injection (B. W. Co.) for a while, but this made him worse immediately. His fainting spells came back worse than before. Now he even got them in the streets, while formerly he always got them at home and generally at evening after a day of more than usual mental strain. About this time I sent my first letter to you and commenced giving injections of your polyglandular extract, which he got on the following days, 1 c.c. each time: 1912, October 8, 9, 11, 14, 17, 20, 24, 30; November 7 (November 10, adrenalin), 17 (adrenalin, November 21), 28 (adrenalin, December 2), December 8 (adrenalin, December 30); 1913, January 3, 7, 12, 16, 19, 23, 27; February 2, 7, 10, 16, 22. Excepting the few adrenalin injections, he has not had any other treatment since the first injection of polyglandular extract in October. The improvement was immediate and striking. Weight increased from 135 to 155 pounds; he feels well bodily, and mentally he feels himself at par with the condition before he first got sick. His cheerfulness and self-consciousness returned, his intelligence and professional skill is as good as ever, and lately he has carried on a very successful law practice.

To insure the result he wants to go through another course of twelve injections some time in the spring or summer, but excepting that he does not dare to offer himself the same amount of work as he did before his sickness, he feels as well as ever.

But the blood pressure never changed.

I cannot give any diagnosis of this case. Absolutely nothing of it has impressed me as being hysterical. Epilepsy seems absolutely excluded and neurasthenia seems a rather indefinite diagnosis. In one of my letters I referred to the case as one of sexual neurasthenia and I still think—without being able to give sufficient proof—that this might be right.

SOREN NIELSON, M.D.

The above reports are submitted without comment and without additions or alterations of any kind.

CHAPTER VIII.

Tabes Dorsalis (Locomotor Ataxia).

Horn, in 1816, and Weidenbach, in 1817, were the first to give a description of locomotor ataxia, which to a considerable extent coincides with our modern views of this disease. Prior to that the older writers had denominated as tabes dorsalis any condition which was accompanied by a pituitary discharge from the penis, such as gonorrhea, gleet or prostatorrhea. It was then supposed that the spinal canal was connected with the bladder and penis. Our modern conception of tabes, dating from the writings just alluded to, is that it is a chronic disease involving the sensory portions of the spinal cord, and according to the pathologists up to the present time there has been declared to be a sclerotic degeneration of the essential parenchymatous tissue. However, this particular point will be discussed later.

The close relationship between tabes dorsalis and syphilis is well recognized, and, in fact, it is doubtful whether true tabes ever occurs without either hereditary or acquired syphilis in some form being present. Nevertheless there are tabetic patients who positively deny any syphilitic infection and whose undoubted veracity upon all other subjects entitles them to credence upon this matter also.

In these instances two possible explanations may be suggested. There may be a separate and distinct toxin capable of producing tabes and actually producing it sometimes, though rarely, without the co-operation of any other infection, but the human organism usually resists and expels this hypothetical toxin, unless the invader is reinforced by the spirocheta pallida, the germ of syphilis. The other explanation is that the specific infection is denied, because it occurred wholly unconsciously. It is possible that a drinking cup, or glass, used by a person with a mucous patch upon his lip, might retain upon its rim some toxic particles. These particles might lodge on the lip of a second drinker and pass beyond the defensive integument through some slight abrasion. The wound and the ensuing irritation might seem so trivial as to create no uneasiness and to be soon wholly forgotten; and yet through that slight fissure the toxin had gained access to the blood and the irrevocable damage had been done. One of the great mysteries concerning this subject, however, is why ninety-nine individuals who contract syphilis do not develop tabes, while the hundredth one does. In other words, only in from 1 to 5 per cent. of all cases of persons who are infected by syphilis, no matter what their treatment for this disease may have been, eventually develop tabes. Because of this comparative rarity of locomotor ataxia among syphilitics many other exciting causes have been suggested as producing tabes besides syphilis, such as overfatigue, alcoholic or sexual excess or traumatism, but none of these alone seem to be sufficient to account for the presence of the phenomena which we find in this disease.

The finding of the spirocheta pallida in the substance of the spinal cord by Noguchi is also strong evidence of this germ being the active cause of tabes. However, it does not explain why only this very small percentage of persons infected with syphilis develop locomotor ataxia, because it is more than probable that in all cases of syphilis the spirocheta pallida eventually finds its way into the tissues of the cord. We will endeavor to explain in this chapter the difference in resistance to this infection.

There is in all probability a difference in the virulence of different strains of syphilitic infections, and it is well known that numerous cases of tabes follow in the wake of certain prostitutes, but there is, the author believes, an underlying deficiency on the part of the individual which is a necessary factor before these spinal changes can take place. Notwithstanding the finding of the spirillum by Noguchi, we must not confuse locomotor ataxia with spinal syphilis, and we must remember that from a therapeutic standpoint there is also a vast difference, as the anti-syphilitic remedies which are so potent in spinal syphilis have little or no effect in tabes.

Tabes usually develops in persons between 20 and 40 years of age, but it may occur as early as the tenth year or as late as 65. The first symptoms usually make their appearance from ten to twenty years after the initial infection, although they may occur as early as five years after the syphilitic infection and as late as forty years afterward. Although it has no regular mode of onset, the earliest symptom usually is pain. These pains are of a lancinating character, and may occur in any part of the body, including the head, face and eyes, and are not infrequently diagnosed as neuralgia, neuritis or rheumatism; their most frequent site of onset is in the lower extremities. The stomach or intestines may be involved, and in those cases the pains or crises may be accompanied by vomiting or other gastro-intestinal disturbances, and are frequently treated as local conditions. It is seldom that the diagnosis of tabes is made early, because of the tendency of the general practitioner to attribute the pains to other causes. These pains are in all probability due to leptomeningitis, and later, when the sclerotic changes become more marked, as a rule the pains are less severe, or may even be absent. The patient early develops disturbances of sensation, anesthetic areas or paresthesia. He feels as though he was walking on cotton or leather, and his movements are apt to be exaggerated; his feet are lifted too high and brought down with a noisy thud. He experiences difficulty in walking without staggering or in using his hands for fine work. This constitutes the ataxia which gives the disease its name. Then he develops an inability to stand with his eyes closed or to walk in the dark. One day while washing his face, which necessitates the closing of his eyes for a second, he finds himself unable to stand. These are frequently the first symptoms which cause alarm on the part of the patient, although an optic atrophy or ptosis of the lid or diplopia, due to an external squint, may develop as the very first symptom, and cause the patient to seek the physician.

A marked asthenia may develop early in the disease and may be responsible for a diagnosis of neurasthenia, although many of the patients are comparatively strong. Asthenia, however, almost invariably develops sooner or later, and this asthenia is frequently both mental and physical. The patient experiences difficulty in cerebration.

Upon examination it is found that the patient walks with difficulty, has a peculiar uncertainty of motion and is unable to place his feet upon definite spots or use his hands in delicate manipulations. He is unable to stand without swaying with his feet close together and his eyes closed. This constitutes the so-called Romberg sign. The pupils do not react to light, although they do to accommodation (Argyll-Robertson pupil). The patellar reflex or knee-jerk is absent and the Achilles reflex is also wanting. The areas of anesthesia and paresthesia are easily elicited. The patient may complain of menièrè syndromes, which are accompanied by nausea and vomiting, and, of course, dizziness and vertigo. The heart may show irregularities and respiratory crises have been recorded. The pains are so terrific in many cases as to excite the greatest apprehension on the part of the patient and cause him to live in a state of dread and even to commit suicide in order to escape them.

Cranial nerve involvement is not infrequent. Vesicle disturbance is usual, and the patient complains either of incontinence of urine or difficulty in starting or retaining his urine. Impotency develops early, as a rule. Rectal disturbances are also common. There is either incontinence or difficulty in retaining or expelling the feces. The sense of constriction about the waist, designated the girdle sensation, is a very common early symptom. Trophic changes are not uncommon and are particularly apt to occur in the joints. Psychic disturbances are usually present and, as pointed out below, are characteristic of pituitary involvement.

The course of the disease is a long one, lasting from five to fifty years, and may be divided roughly into a preataxic or predromal stage, an anataxic and a paralytic stage. These demarkations, however, are not sharp. The prognosis has heretofore been extremely gloomy, and many observers even to-day are very dogmatic in their declarations that nothing can be done in the way of treatment.

From a rather large series of X-ray studies made of the sella turcica of patients afflicted with tabes, the author is led to believe that in tabetics there is a previous lack of development of the pituitary with a consequent lessening of its function. In all of the cases of tabes whose sella turcica he has examined this fossa has invariably been undersized, and in some cases distinctly abnormally small. This condition must have preceded the onset of the ataxia, and is probably in no way influenced by the infection with syphilis, as the sella could scarcely be diminished in size if it had once been properly developed, although, as suggested by Dr. Geo. E. Pfahler, some of the cases show in their X-ray plates signs of induration in the neighborhood of the sella. If this pretabetic pituitary insufficiency or underdevelopment is a fact, it would perhaps explain why some patients afflicted with syphilis eventually develop tabes, while the vast majority of them do not. It would seem to point to the fact that those with normal pituitaries are immune to tabes, while those with underdeveloped pituitaries plus syphilitic infection become tabetic.

The classical findings of the pathologist in this disease are a sclerosis of the posterior horns of the spinal cord. These post-mortems have been performed chiefly upon persons who have died of this disease, and were, therefore, in the last stages, and their sclerotic development was at its maximum. It may be that this hardening of the cord is to a considerable extent post-mortem. It has been pointed out recently by A. H. MacCordick, in the British Medical Journal, October 18, 1913, that arteries which are extremely brittle immediately after death are sufficiently soft to permit occlusion by ligature just before death. This is attributed to an acid reaction which sets in almost immediately after death, whereas in life the fluids are alkaline and the tissues soft and pliable.

There is great doubt as to whether an actual sclerosis of the cord or any other tissue can ever be overcome by any method of treatment, and a patient who has an actual destruction of the sensory portion of his cord due to sclerosis could not be expected to regain function of the parts supplied by this section, although, as stated by the author elsewhere, it is a well-known fact that nerve tissue has to a considerable extent the power of reproducing itself. The fact that patients who have suffered from tabes to a very marked degree do improve and even get well seems to preclude the possibility of a destructive degeneration being present in all cases, as the author will point out in the appended histories below, many of his patients have under treatment recovered not only their power of locomotion but their sensation and their reflexes. The areas of anesthesia and paresthesia have disappeared and the pupilary and patellar reflexes have returned. The rectal and vesicle sphincters have regained their tone, and their physical condition has returned to normal. This, in the author's opinion, is ample evidence that sclerosis or destruction of parenchymatous tissue is not always present. He believes that in the beginning tabes is an infection by syphilis of a person who has a deficiency in his glands of internal secretion, particularly the pituitary. It has been demonstrated that the pituitary body pours out its secretion into the cerebro-spinal fluid. Extracts of the posterior lobe of the pituitary produce mydriasis when introduced into the eye, and the cerebro-spinal fluid itself, when similarly used, has an identical effect, so long as the pituitary function is maintained. But, as demonstrated by the author, the cerebro-spinal fluid of dogs whose pituitary has been destroyed has a much weaker mvdriatic effect, and eventually loses this power entirely.

It must be remembered that acromegaly and other conditions which are known to be due to pituitary involvement may occur without any demonstrable changes taking place in the organ itself, and in these cases there is in all probability a chemical change in the composition of the secretion rather than an anatomical change in the organ itself. The relation between this disease and acromegaly, which is acknowledged to be a disease of the pituitary gland, also points to the pituitary as a factor in the production of tabes. In the author's opinion, the mode of development of locomotor ataxia is as follows: First, as stated above, an underdevelopment or insufficiency of the pituitary function plus an infection with syphilis, which produces a perverted secretion of this gland, which is poured into the cerebro-spinal fluid, and produces a spinal meningitis accompanied by swelling of the membrane, which produces the crisis of the early stage of tabes, and also by pressure produces disturbance of sensation and function. Later an interstitial inflammation takes place and by pressure an impairment of the function of the interstitial tissue, and still later a sclerosis of the parenchymatous tissue and actual destruction of the essential elements of the cord. This appears to be perfectly rational, and is in harmony with the mode of onset of sclerotic conditions in other organs. This change takes place gradually, and is a rational explanation of the mode of onset and course of this disease. The author has never treated any patients in the third or paralytic stage of tabes, and none of his patients have ever died, so that it was impossible for him to study their cords post-mortem. In the future, however, in view of the success that he has had in the treatment of this disease, he intends to treat cases in the third stage when they present themselves.

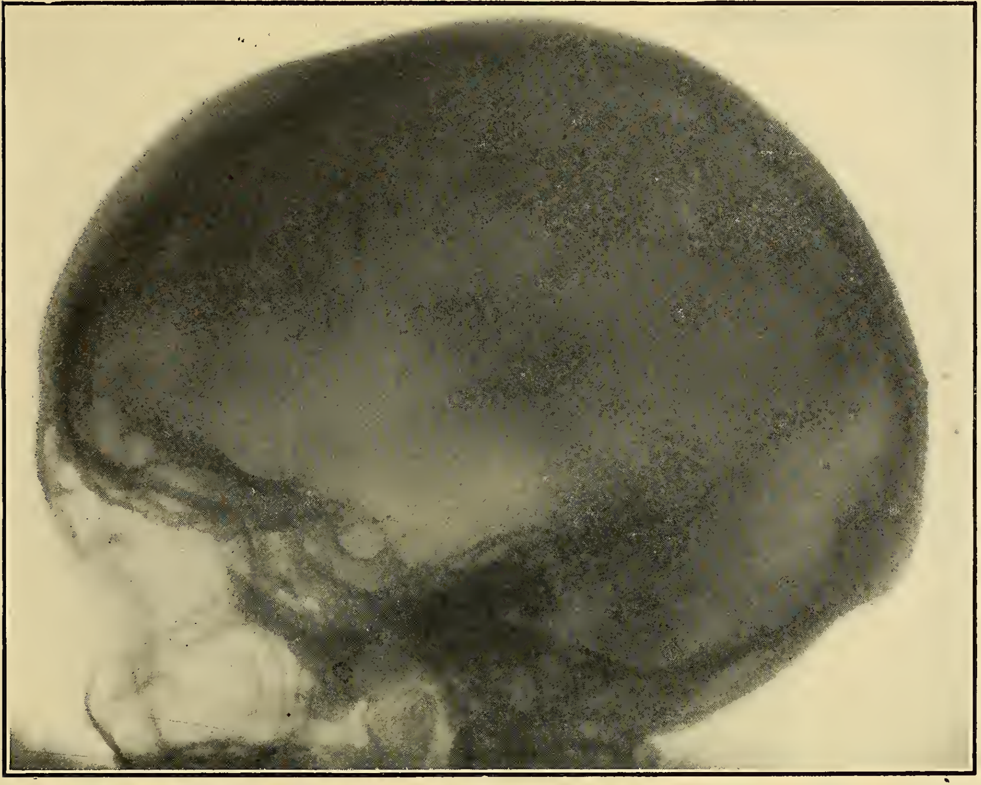
The following comparison will show the similarity between the acknowledged pituitary disease in acromegaly and tabes dorsalis:

ACROMEGALY	TABES
History of syphilis, common.	History of syphilis, common.
The spine is frequently kyphotic in the cervical and upper dorsal regions.	The spine is frequently kyphotic in the cervical and upper dorsal regions.
Lordosis is often present in the lower lumbar region.	Lordosis is often present in the lower lumbar region.
Pupilary and patellar reflexes may be absent.	Pupilary and patellar reflexes are usually absent.
Pains in the extremities.	Pains in the extremities.
Persistent splitting headaches, frequent.	Persistent splitting headaches, frequent.
Glycosuria, frequent.	Glycosuria, frequent.
Polyuria, frequent.	Polyuria, frequent.
Areas of paresthesia,	Areas of paresthesia,

ACROMEGALY	TABES
hyperesthesia, or numbness.	hyperesthesia, or numbness.
Lumbering gait.	Ataxic gait.
Loss of control of sphincters.	Loss of control of sphincters.
Impotency.	Impotency.
Paresis of the third nerve, causing an external squint.	Paresis of the third nerve, causing an external squint.
Bitemporal hemianopsia.	Bitemporal hemianopsia.
Optic atrophy.	Optic atrophy.
Neuro-retinitis.	Neuro-retinitis.
In the earlier stages increased temperature around 99 to 100.	In the earlier stages increased temperature around 99 to 100.
In the later stages decreased temperature with chilly sensations, temperature ranging from 97 to 97.5.	In the later stages decreased temperature with chilly sensations, temperature ranging from 97 to 97.5.
Blood pressure below normal.	Blood pressure below normal.
Mental symptoms.	Mental symptoms.
In the earlier stages excitability, irritability, tendency to verboseness.	In the earlier stages excitability, irritability, tendency to verboseness.
In the later stages docility, impaired memory, apathy, dullness.	In the later stages docility, impaired memory, apathy, dullness.
Spontaneous remission of symptoms may occur, lasting for various periods.	Spontaneous remission of symptoms may occur, lasting for various periods.
Duration of disease, from five to fifty years.	Duration of disease, from five to fifty years.
Death, sometimes due to diabetic coma.	Death, sometimes due to diabetic coma.

The treatment of tabes comprehends prophylaxis, hygiene, exercise, electricity and medicinal and organotherapeutic measures. The most important points in prophylaxis are education concerning both the prevention and the treatment of syphilis. Every one should be impressed with the supreme importance of avoiding this dread infection by absolutely shunning its usual haunts and also by guarding against accidental transmission by such means as the drinking cup referred to above. If, in spite of all care, syphilis be contracted, then there should be prompt, thorough and persistent treatment with rigid avoidance of over-fatigue, over-indulgence in alcoholics and sexual excesses. It must be borne in mind that, even when syphilis is not eradicated, many of its consequences may be held in abeyance. There are many syphilitics who never develop locomotor ataxia.

Hygienic measures are used, as in other chronic diseases, in the usual way and with the usual purpose of increasing and prolonging the resistance which the body makes to the advancing malady. A number of so-called systems of exercise have been devised and employed, all being intended to improve the muscular control and, to that extent, overcome the ataxia. None of these, however, have any tendency to check the progress of the disease. Electricity is of some benefit in producing better muscular tone; but beyond this has no favorable action. With our usual drugs the outlook is equally gloomy. As antisyphilitics, mercury, the iodides and salvarsan are of some avail; but beyond this salvarsan is contraindicated and is to be feared, especially when there is any involvement of the optic nerve. Opiates are required in cases where the pains are intolerable and laxatives where con-



X-ray of case No. 1, showing extremely small sella turcica with clinoid processes overlapping. Taken and interpreted by Dr. Geo. E. Pfahler.

stipation is a prominent symptom. All of these efforts have but a palliative effect and rapidly or slowly, but steadily, the malady moves on to the fatal termination.

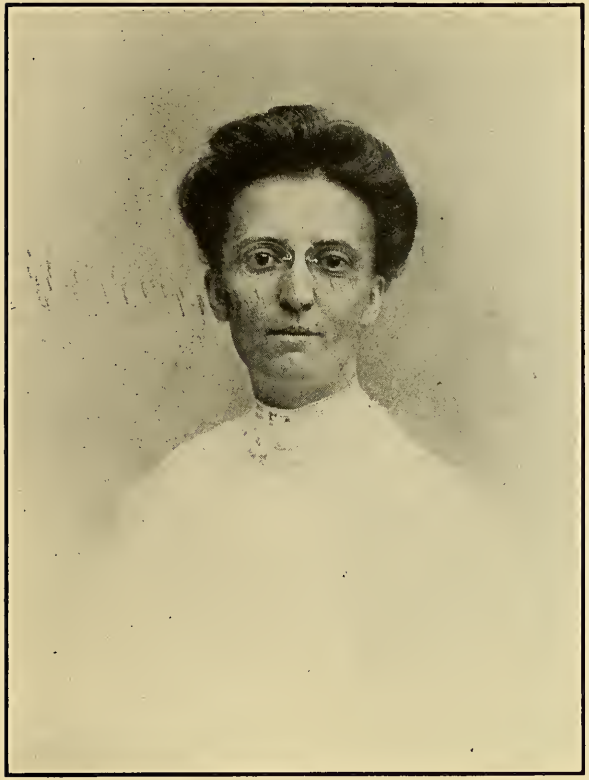
Although in this chapter the author uses the word tabes dorsalis and locomotor ataxia as synonymous, it must be understood that locomotor ataxia is really only one of the symptoms of tabes dorsalis, and that a cure of the locomotor disturbance is by no means equivalent to a cure or arrest in the progress of the disease itself. However, for the sake of brevity in speaking of the results in the treatment of this disease, the author intends to convey the fact that he is treating the disease itself and not merely any symptom, or combination of symptoms, and that when he speaks of entire relief he means from the disease in toto.

Prior to the year 1908 the author had no thought of finding a remedial agent that would be serviceable in tabes, having accepted the view then universal that it depended upon organic lesions which were beyond remedy. At first, when patients suffering from tabes presented themselves for treatment, the author declined to accept them, but after having more experience and receiving reports from other physicians to whom he had furnished the solution for the purposes of study and who had been much more daring than he had been, his courage increased. Eventually he treated quite a number of cases of locomotor ataxia, and has been fortunate enough to exhibit before members of the Philadelphia County Medical Society several cases of locomotor ataxia treated by this solution, in which all symptoms of the disease disappeared and restoration of function was complete.

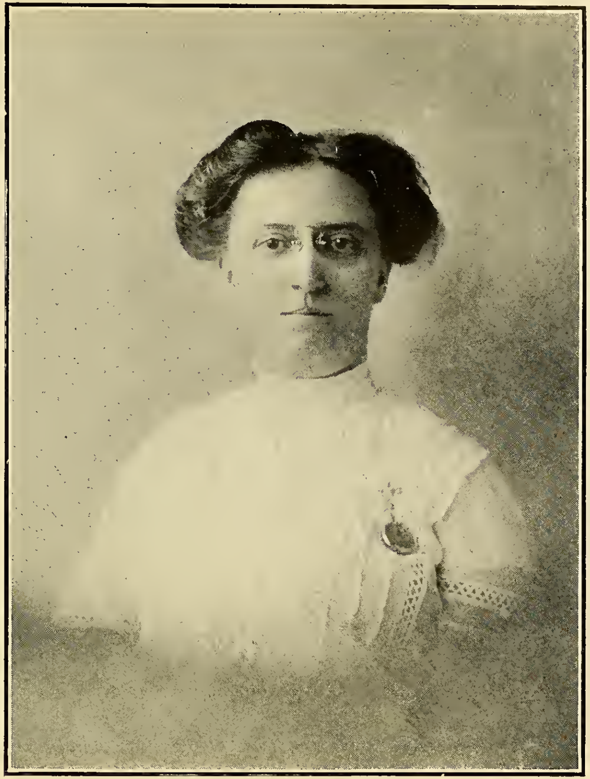
During the years which have now passed, the polyglandular extract has been administered to many tabetics, with the hopeful results shown in the clinical histories appended to this chapter, which are selected from a large number, and in the author's opinion bear out by both their clinical history and response to treatment his belief that pituitary involvement is a necessary factor in this disease. The work already done has proved beyond question that locomotor ataxia is not of necessity irremediable, and in proving this has raised a doubt regarding the pathology of the disease.

The subjoined clinical histories present briefly the present aspect of organotherapy as related to tabes dorsalis.

Case No. 1. July 12, 1912. Female, age 40; married; one child aged 17. Family history: Father aged 61; has pulmonary tuberculosis, cirrhosis of liver and kidney trouble of unknown nature. Mother, aged 61, has gallstones. Brother, aged 38, has pain in feet, stomach, eyes, region of heart, and has for many years been subject to attacks of vomiting; has bitemporal hemianopsia and contracted pupils. Cause of brother's condition not determined; symptoms point toward dyspituitaryism. A distinct history of tuberculosis through entire family. Otherwise negative. Previous history:

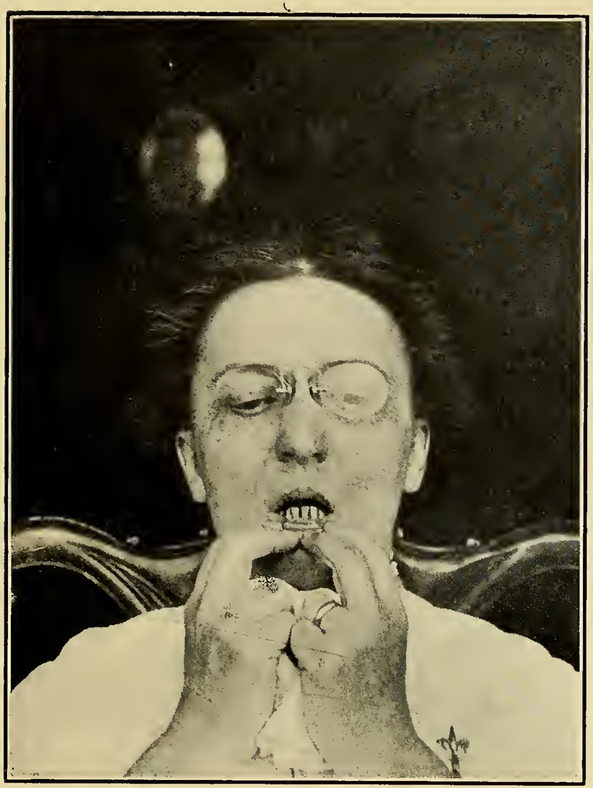


Case No. 1 in 1912 before treatment.

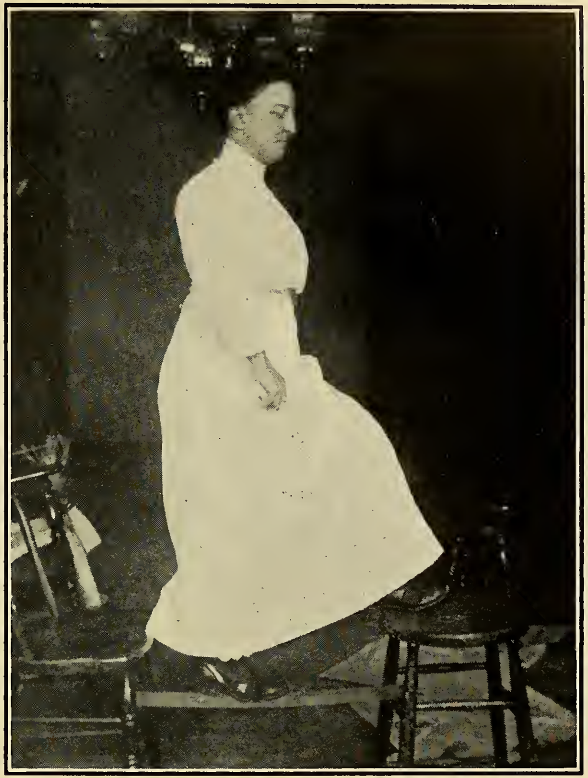


Case No. 1 in 1914 after treatment.

Mumps and measles at age of 7, and repetition of measles at age of 25. Commenced menstruating at 12½ years; always regular of the 28-day type, lasting for four or five days. Within the last twelve years has been diminished in quantity and lasts about two days. At age of 13 commenced having muscular twitchings in arms and legs, which were relieved by rest. These pains grew progressively worse, and she developed stabbing pains in stomach, accompanied by vomiting, which have recurred at such frequent intervals, up to the present time, as to make patient an invalid, confining her almost constantly in bed. At age of 20, pain in back, left side and chest developed. The twitchings were so severe as to make sleep impossible. Very asthenic. Choking upon partaking of fluids developed; numbness of extremities, stupor and difficult breathing. Twelve years ago pains in eyes and back developed together with diplopia (double vision), lasting several months. Diplopia was accompanied by intense pains in eyes and headaches and nosebleeds. Diplopia disappeared without special treatment. At this time noticed difficulty in walking in dark or standing with eyes closed; tendency to fall backwards when ascending stairs. Knees were weak and quivering and frequently gave way, causing patient to fall forward when attempting to walk. Sat up on six pillows for five years. During attacks of pain there was complete retention of urine, making catheterization necessary. There was, however, polyuria and polydipsia. The amount of urine of twenty-four hours was considerably increased. It was necessary to give morphine hypodermically and other hypnotics to control pain. Was treated by various physicians in Boston, who pronounced her condition rheumatism, neuritis, and finally locomotor ataxia. She came to Philadelphia five years ago. Was examined and treated by various physicians, at various hospitals on four occasions, one of which was of nine weeks' duration, at the Hospital of the University of Pennsylvania, where diagnosis of tabes was made and concurred in by a number of physicians. Was treated at the Jefferson Hospital, Northwestern General and American Hospital for Diseases of the Stomach, at all of which institutions the same diagnosis and hopeless prognosis was made. Was referred to author by Dr. I. R. Strawbridge of American Hospital for Diseases of the Stomach. Present condition. Complains bitterly of frequent recurrences of lancinating pains in eyes, head, arms, legs and stomach; vision of left eye very much impaired. Sensitive to cold, and experiences chilly sensations. Constriction around waist. Examination. Short, plump female; dark complexion; thin hair; delicate skin; brown eyes; rather poorly developed jaw and chin; small nose; small mouth; widely spaced teeth; thyroid distinctly atrophied. Chest and abdomen normal; slight loss of station and ataxia; Argyll-Robertson pupil; lost knee-jerk. Temperature 97; hands cold; thin, slow intermittent pulse; blood pressure 100 m.m. Treatment. Injections twice weekly



Case No. 1, showing spacing of teeth.



Case No. 1, standing on one and one-half inch stick suspended between two chairs with eyes closed. An extremely difficult position.

for four months. Has been absolutely free from pain or girdle sensation during this entire time, excepting one occasion upon July 18th, when she had an attack of pain produced by unusual fatigue. At the present time patient is free from all symptoms, excepting Argyll-Robertson pupil. Kneejerk has returned. Has gained twenty-two pounds in weight. No specific history. Wassermann negative; formerly positive.

Patient was exhibited before Philadelphia County Medical Society, December 11, 1912.

Case No. 2. April 23, 1913. Age 40; occupation bailiff; married three years; one child. Family history negative, excepting an aunt complained of pains resembling gastric crises. Previous history. Ordinary diseases of childhood; no other disease, excepting gonorrhea at 18 and ptomaine poisoning in 1909. Had Wassermann in 1911 negative. First noticed stabbing pains in abdomen in 1909; pains then developed in arms, legs and rectum, and girdle sensation appeared. Had splitting headaches and nosebleeds at this time. Vision began to fail. In 1910 noticed first trouble in walking down steps and found he could not stand with eyes closed. Left foot became numb. Present condition. Suffers with gastric crises and stabbing pains in various parts of body. Walks with difficulty with cane. Bowels constipated; has difficulty in passing urine while standing, some incontinence. Appetite good; sleeps good when there is no pain. Unable to determine position of legs and feet in bed, and cannot distinguish between tiles of bathroom floor and carpet. Nerves irritable, of a morose positive disposition. Examination. Height six feet; weight 130 pounds; dark complexion; coarse hair; brown eyes; external squint; vision very much impaired; eyes prominent; considerable optic atrophy and temporal hemianopsia. Frontal region very prominent; high cheekbones; square jaw; prominent chin; large lips; large nose, both long and broad; skin of face coarse and boggy. Cervical and upper dorsal kyphosis and lumbar lordosis. Clavicles conspicuous, as also other acral parts. Large hands, large feet. Distribution of hair on the scalp of the acromegalic type; eyebrows and hair of scalp meet. Complains of chilliness. Loss of station; Argyll-Robertson pupil; lost knee-jerk; very marked ataxia of both hands and feet. Blood pressure 100 m.m.

This case is undoubtedly one of original hyperpituitaryism with beginning dyspituitaryism. Treatment. Injections daily until June 16th. There was distinct improvement in ability to walk; ataxia of both upper and lower extremities was less marked; pains disappeared almost entirely, excepting on one occasion, and general condition was distinctly improved. Is able to determine position of extremities and distinguish between tile and carpet. Patient was under a great mental strain because of family worriment and the fact of being away from home. Was seized with homesickness and returned to his family.

Case No. 3. October 4, 1912. Male, age 60; widower. Father of six children, who all grew up. Family history. Father died at 69 of tuberculosis. Sister died of Bright's disease at 63; otherwise negative. Previous history. Ordinary diseases of childhood; mumps at 17, with orchitis. Had severe pneumonia at 22; typhoid fever at 42, complicated by abscess of kidney; was neurasthenic at 22. No other disease. The patient denies syphilitic infection, but it is probably present. Five years ago the feet began to feel heavy. Physicians made a diagnosis of locomotor ataxia and prescribed rest in bed for six weeks with massage and cheiro-practic treatment. Present condition. He sleeps well; appetite and digestion are good and the bowels regular. The ataxia is advanced. He cannot stand unassisted and walks with the help of a nurse and two canes. Examination. Height six feet. Skin sallow and leathery; coarse hair; large bones, prominent frontal region; prominent eyes; square jaw with protruding chin. Thyroid atrophied; larynx prominent; clavicles prominent; muscular development fair; inclined to be thin. Complains of chilly sensations and unable to stand cold weather. Temperature normal; pulse 110; blood pressure 110 m.m. Marked ataxia of both upper and lower extremities. Distinct signs of former hyperpituitaryism. Lost station; Argyll-Robertson pupil; lost kneejerk.

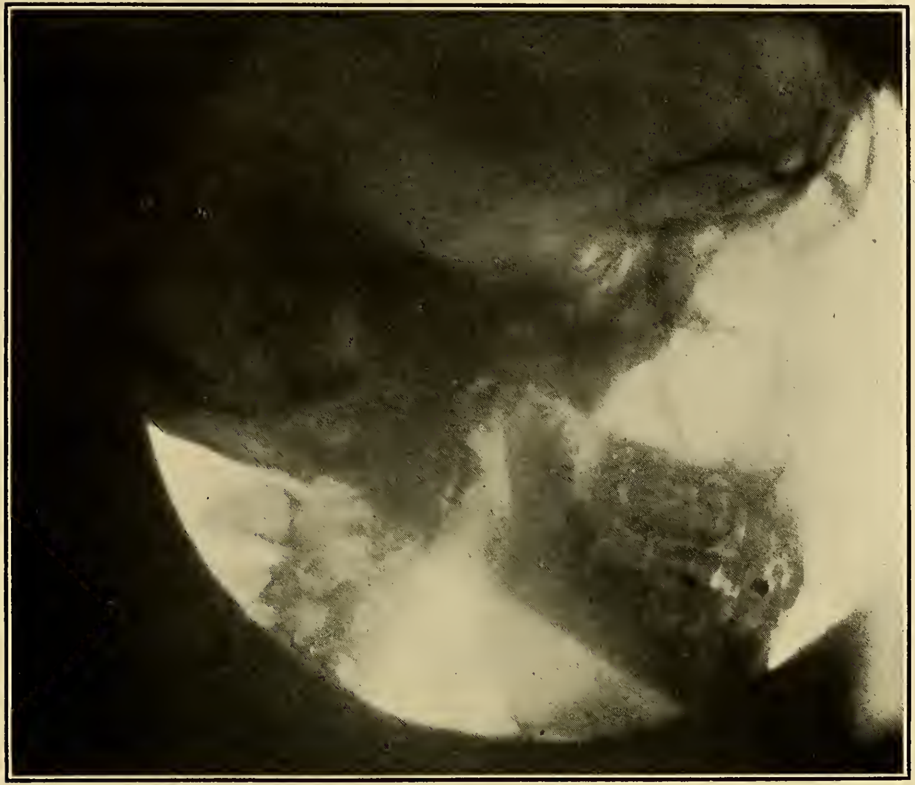
Received seven injections at intervals of three days, when he could stand without assistance and put his shirt on or off over his head. He could also take four or five steps upon the floor without canes or other help. He then stopped coming for treatment without apparent cause, although he seemed upon a fair road to recovery. This patient was seen September 17th after the lapse of about one year. Although he had received no treatment of any kind in the meantime, he was able to stand and take several steps without any assistance.

Case No. 4. December 6, 1912. Male, aged 40; married nine years; no children. Family history good. Previous history. Ordinary diseases of childhood; gonorrhea at 20, 25, and 30; syphilis at 28. Five years ago first experienced pains in legs, which were diagnosed as sciatica; two years later the pains became very severe and anesthesia of both heels appeared. In April, 1910, he visited the springs at Mount Clemens and was treated by a physician there without benefit. At that time there was slight ataxia with Romberg sign; knee-jerk absent Argyll-Robertson pupil present. After leaving Mount Clemens, he tried to resume work, but stopped within a week. He was treated by a New York physician, without benefit, then entered the Philadelphia Orthopædic Hospital, where he remained fourteen weeks; on leaving was unable to walk without assistance. Unable to determine position of legs and feet in bed, and cannot distinguish between tiles of bathroom floor and carpet. He took exercises with some benefit. Examination. Medium height, spare build; prominent frontal region;

square jaw; slightly protruding chin; fine hair and delicate skin, weight 139½ pounds. Probable signs of dyspituitaryism. Thoracic and abdominal viscera normal; lost station; Argyll-Robertson pupil; lost knee-jerk; marked ataxia. Slight cervical and upper dorsal kyphosis and lumbar lordosis. Blood pressure 90 m.m. Received injections daily up to January 25, 1913, when his weight was 144½ pounds and he could stand with eyes closed; walk a chalk line, directing movements of arms and legs at will. Able to determine position of extremities and distinguish between tile and carpet. Ataxia has disappeared. Upon March 27, 1913, he was exhibited before members of the Philadelphia County Medical Society and has since returned to business.

Case No. 5. Male, age 46. Family history good. Previous history. Ordinary diseases of childhood; diphtheria at 11; gonorrhea several times between 16 and 20; denies any syphilitic infection. Three years ago, December, 1909, tabes was diagnosed, the first symptoms being ptosis of the left eyelid and partial loss of vision in that eye; also splitting headaches and nosebleeds. Then followed anesthesia of hands, feet and legs with marked girdle sensation and lightning pains, especially in the back. Patient is unable to determine position of legs and feet in bed, and cannot distinguish between tiles of bathroom floor and carpet. Very asthenic and extremely sensitive to cold. Temperature 97.5; feels chilly and skin feels clammy to touch. Examination. Height six feet;

slender; distinctly emaciated appearance. Dark complexion; brown eyes; fine hair and delicate skin. Ptosis of left eyelid and pronounced squint of same eye. Almost complete loss of vision of this eye and considerable impairment of the vision of the right eye. Considerable optic atrophy. Physical examination of chest shows slight mitral-stenosis. Otherwise negative. Stomach considerably fallen. Loss of station; Argyll-Robertson pupil; lost knee-jerk; unable to walk or stand without aid of nurse and cane. Very marked ataxia of both hands and feet. Cervical and upper dorsal kyphosis and lumbar lordosis. Blood pressure 110 m.m. In this case there is a distinct involvement of the pituitary, evidently a pituitary insufficiency superadded on an early hyperpituitaryism. Treatment. Received three injections during the week following December 29, 1912, after that daily injections. At the end of second week was able to stand without assistance, even with eyes closed, and to walk fairly well without any aid. At this time tingling sensations in feet and hands were experienced. At end of third week, the patient was able to detect the nap on a piece of cloth; this was formerly impossible on account of anesthesia in the hands. He can stand on one leg, cross legs while standing and direct movements with very little ataxia. His weight has increased ten pounds and anesthesia has disappeared in hands, feet and legs below the knee. Patient is able to determine position of extremities and distinguish between tile and carpet.



X-ray of case No. 8. Sella turcica apparently normal. Taken by Dr. Chas. Eastmond,
67 Hanson Place, Brooklyn, N. Y.

He still suffers from asthenia, but that is rapidly diminishing.

Case No. 6 was treated by a physician of Washington, D. C., who sent the following report:

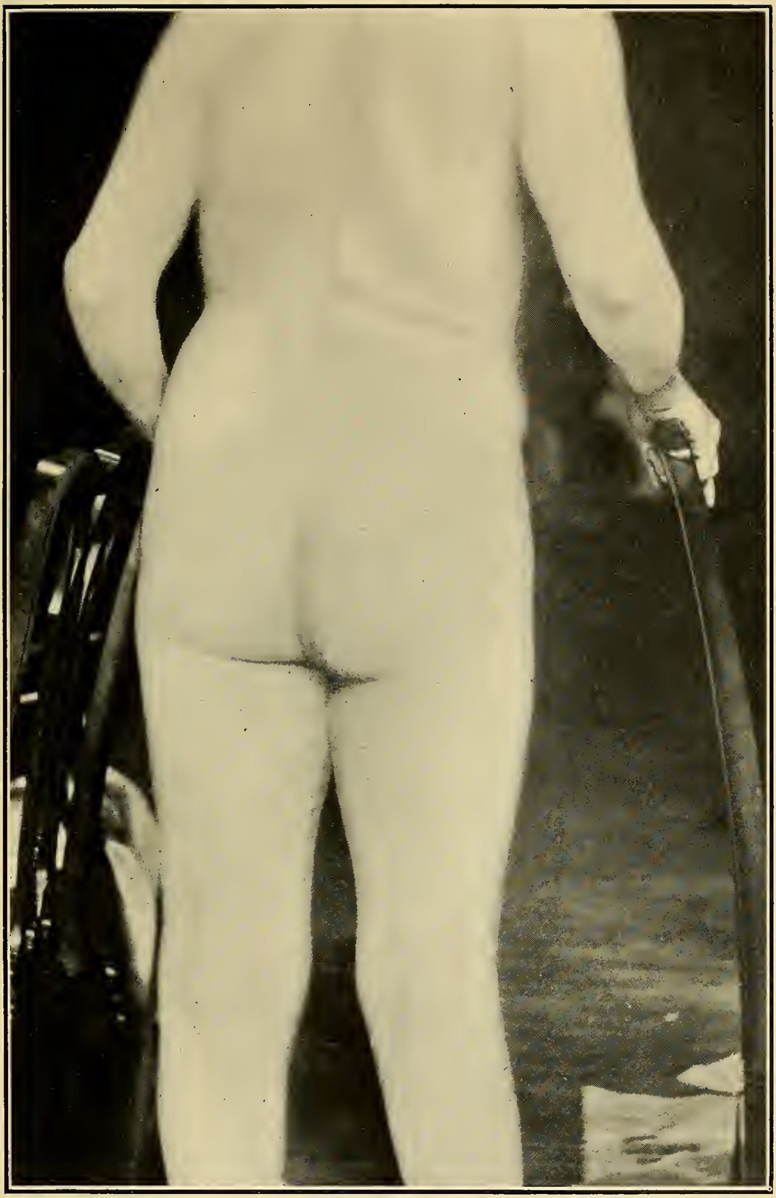
Enclosed you will find in detail the improvement noticed by me in the Case . . . following the injections of your solution. He is most enthusiastic over the changes, which are very apparent and real. I am delighted to see such changes and hope they will be permanent. You are open to great congratulation.

(Signed) HOMER FULLER, M.D.,
204 The Farragut, Washington, D. C.

Injections of one c. c. of polyglandular extract on September 1, 2, 3, 4, 9, 13 and 20. Noticed first improvement after the fourth dose: increased appetite; gradual and very noticeable decrease of pains in lumbar region, left hip, left heel and right great toe. Noticed immediately after injection a systemic response, i. e., an exhilarating effect lasting several hours. At the end of the seven injections, patient notices continued improvement of all symptoms, greater improvement than at end of fourth; a five-pound gain in weight and a decided increase in sexual power. Bowels now much more regular, though not normal, and a real, continued exhilarating effect of whole body. Eyes feel less sore. Greatest noticeable effect is on sexual powers. Patient is very enthusiastic and encouraged by improvement following injections.

Case No. 7. Feb. 25, 1913. Male, aged 40, merchant. Family history negative, except that father died of a throat disease (probably specific), having become paralyzed before death. Previous history. Ordinary diseases of childhood; scarlet fever, very severe at 14; gonorrhea at 25; excessive drinker for ten or more years; total abstainer for the last three years. No history of syphilis; there was one Noguchi test, which was positive, and five Wassermann tests, which were negative. Treated for syphilis by usual methods for several years. Three years ago he first experienced anesthesia of the feet and legs with a "giving away at the knees." He could walk without staggering. He was kept in bed eight weeks, then allowed to sit up half an hour a day for two weeks, then two hours a day, the sitting periods being gradually lengthened. During this course of treatment he received light massage. He had incontinence of urine while in bed and when that treatment terminated he was for a time unable to stand; complained of cold sensation. Unable to determine position of legs and feet in bed and cannot distinguish between tiles of bathroom floor and carpet.

Examination: Height 5 feet 11½ inches; slender man, weight 129 pounds; small bones, delicate skin and clammy to touch; light complexion, fine hair; prominent frontal region; high cheek bones; square jaw; prominent chin. Chest and abdomen negative. Cervical and upper dorsal kyphosis and lumbar lordosis. Unable to walk



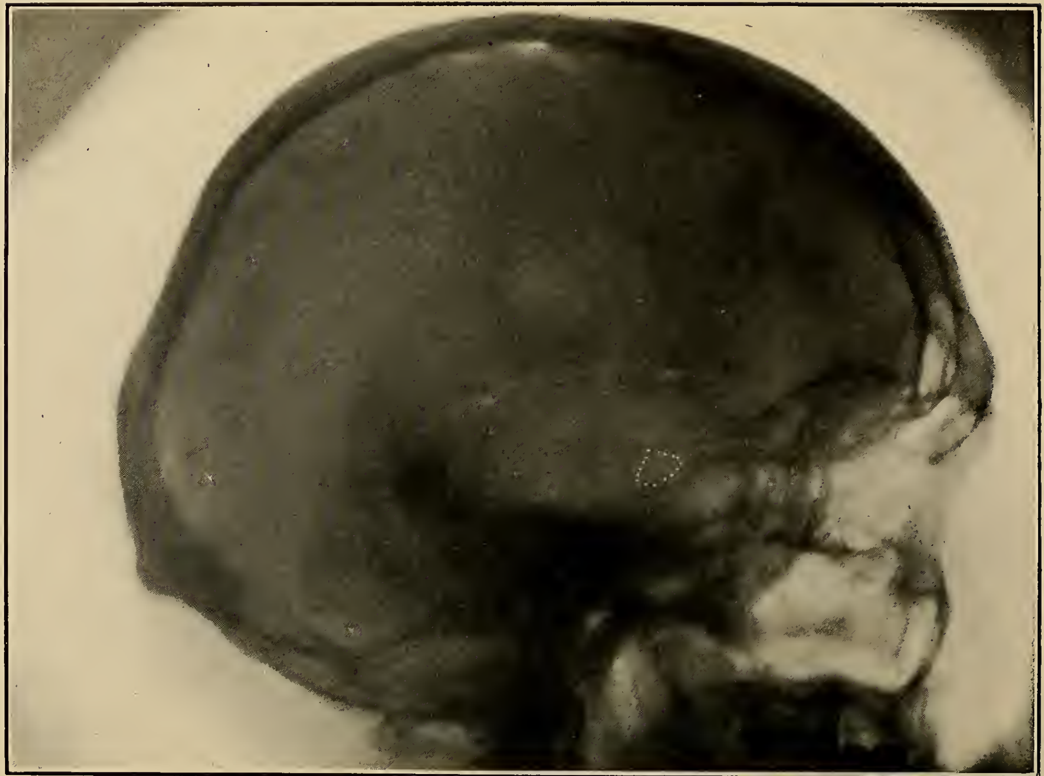
Back view of case No. 9, showing feminine conformation and adipose condition.

without help of a nurse and cane; Argyll-Robertson pupil; lost knee jerk; Romberg sign very pronounced; pains in arms and legs; marked ataxia; impotency; signs of hypopituitaryism prominent in this case. Blood pressure 120 m. m. Received injections three times during first week; then daily until April 5, 1913. After the first injection he was more steady and had better control of his hands. After the fifth injection he walked better in the dark. From this time on his improvement was steady and rapid; at the end of five weeks his pupils responded to light as readily as any normal pupil, the Argyll-Robertson sign having entirely disappeared, and this is a matter of the greatest significance, as it is indisputable evidence of restoration of nerve function. This patient is able to determine position of extremities and distinguish between tile and carpet. He now walks without a cane or any other assistance, and with no apparent impediment. He was exhibited before members of the Philadelphia County Medical Society upon March 27, 1913.

Case No. 8. May 20, 1913. Age 47. Occupation merchant. Family history negative. Previous history. Ordinary diseases of childhood. For the past 8 years has suffered from dizziness and sensation of objects moving before eyes. Condition diagnosed as auto-intoxication first, then locomotor ataxia by several New York physicians. Present condition. The past ten weeks was unable to walk without cane and assistance of nurse. Lightning pains in different parts of body have been troublesome for 5 years and are especially so at present. Examination. Medium height; small delicate hands with tapering fingers. Light complexion; blue eyes; bald head; inclined to obesity. Conformation of body distinctly feminine in type. Sexual organs underdeveloped. Large breasts; large hips; general round conformation of arms and legs; delicate skin and deliberate in speech and movements. Chest and abdomen normal; dry skin, cold to touch; temperature 97. Has areas of anesthesia and paresthesia, unable to stand unassisted even with legs far apart and eyes open. Romberg sign and Argyll-Robertson pupil, lost patellar reflex; some incontinence of urine and feces. Extremely ataxic in his attempts to walk; nerves fairly good; appetite fair; bowels regular; very asthenic; blood pressure 85 m. m. This is a conspicuous example of pituitary insufficiency with an inclination to reversal of sexual type. Treatment. Injections once daily for 48 days. Pupilary reflex returned after sixth injection. Ataxia disappeared to such an extent, patient was able to walk without any perceivable symptom; was able to walk up and down stairs with arms folded. Returned to business. Patient referred by Dr. W. J. Brandt, 251 Carroll Street, Brooklyn, N. Y.

The following are letters received from the patient on September 23d and November 5, 1913:

"Since my return I have been steadily improving. I



X-ray of case No. 9, showing small sella turcica. Taken and interpreted by Dr. Geo. E. Pfahler.

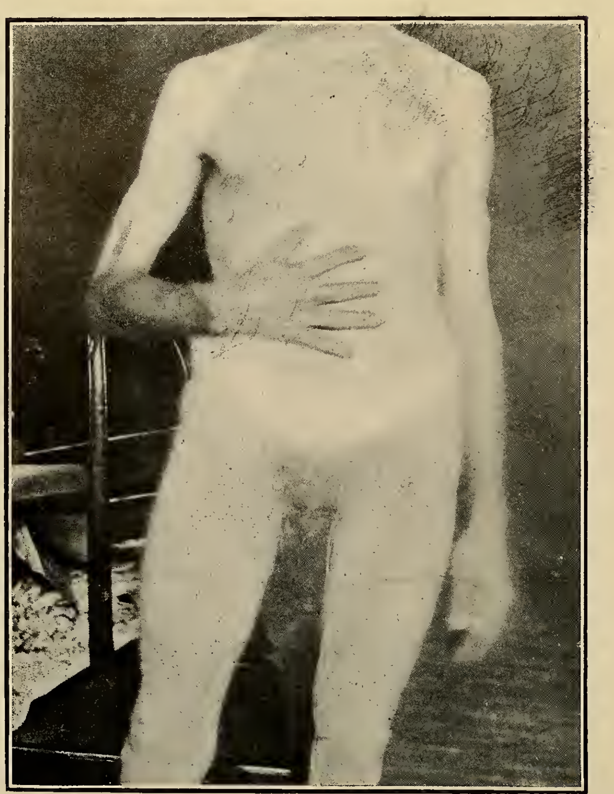
have not used a cane for eleven weeks. I purchased a machine (Ford car) and find that I can handle it in fine shape. My feet behave beautifully and I keep my nerve in any kind of congested sections. I also crank my car thirty to forty times a day and I do not seem to feel any effect of this strain on my back. I also work on my car, do all the oiling, fill grease cups, which puts me in all kinds of positions, but, of course, then I feel the strain of getting up from a stooping or bending position."

"I am feeling better every day, really much better than I have felt for the past two or three years. I cover twenty to thirty miles a day in my machine, come home to lunch and take her out in all kinds of weather. The cold bracing air is fine; no pains: stomach in fine order, bowels good, my feet are warm when out riding. In fact, my entire body seems to have an even temperature.

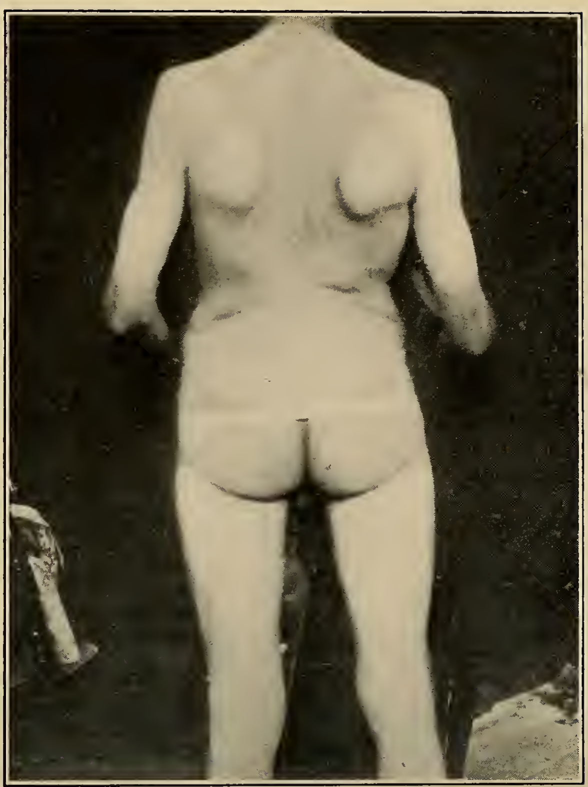
Some day I hope to call on you socially and you will see a great change for the better."

Case No. 9. June 27, 1913. Age 56; occupation, retired. Married 21 years. One child; no other pregnancies. Family history. Father died at 73 of diabetes. Mother still living. Otherwise negative. Previous condition. Ordinary diseases of childhood: scarlet and a severe sickness, nature unknown, in early infancy. Patient himself believes it was manifestation of congenital syphilis. Gonorrhea several times between 23 and 24. Denies syphilitic infection. No other sickness, excepting 12 years ago met with an accident while bicycling; back was injured. About 12 years ago was also in a railroad accident, in which both legs and clavicles were broken. Head was injured and was unconscious, but skull was not fractured. Ten years ago had shingles on left side. Nine years ago commenced having pains in legs, starting at heels. Pronounced sciatica. Pain was of a jerky or stabbing nature. Appetite good, digestion good; bowels regular; sleeps well; inclined to be nervous and easily excited. Present condition. Walks with utmost difficulty; leans heavily on cane in right hand and assistance of nurse on left side; unable to stand alone, even with feet widely separated. Stabbing pains and contractures of legs; lightning pains through stomach and intestines; also twinges in arms and hands; tendency of ankles to turn over. Is impotent. Tendency to strangle upon eating or drinking, and very asthenic.

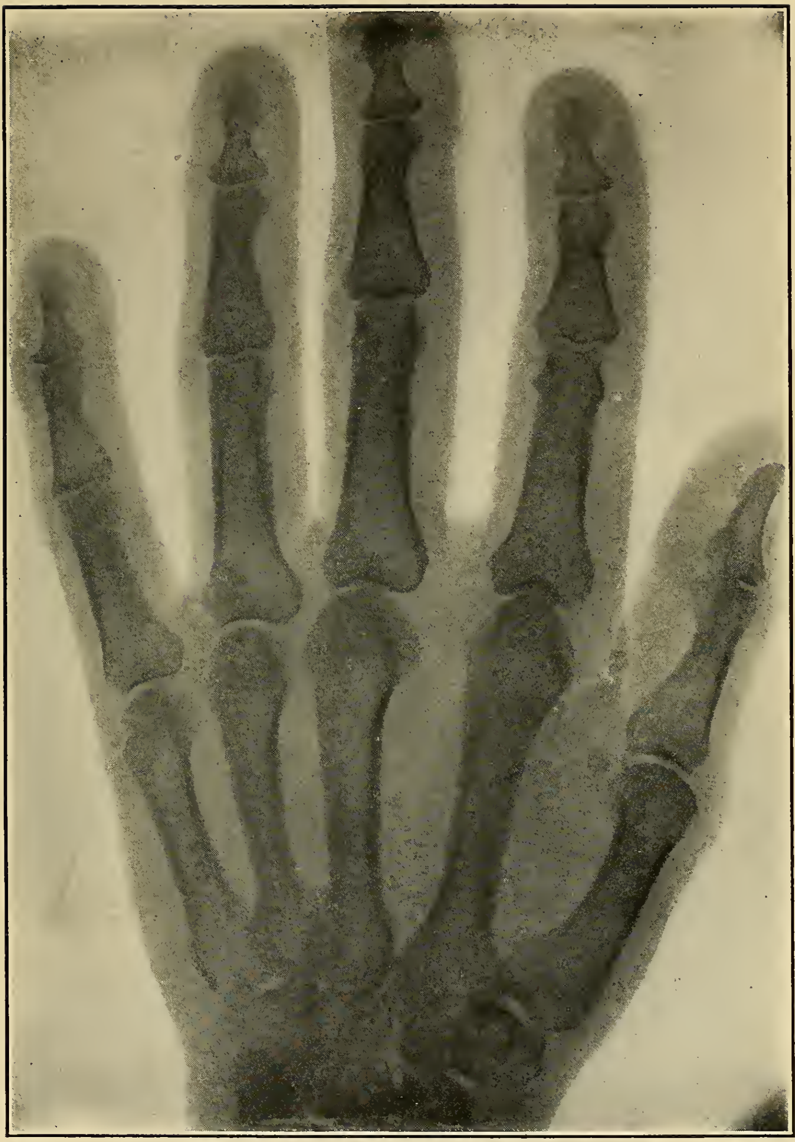
Examination. Tall man, about six feet; slightly obese; of light complexion; fine hair; delicate skin, which is inclined to be scaly in spots over entire body. Broad face; sharp nose; genial, amiable expression; cervical and upper dorsal kyphosis and lumbar lordosis (moderate). Thyroid gland impalpable. General conformation of body and distribution of hair distinctly feminine in type. Temperature 97.3. Skin decidedly cold and clammy to touch. Slow and deliberate in all movements and docile and amiable in temperament. Thoracic and abdominal viscera normal; tender spot at seventh dorsal



Front view of case No. 10. Note large hand with thick fingers, indicating acromegaly.



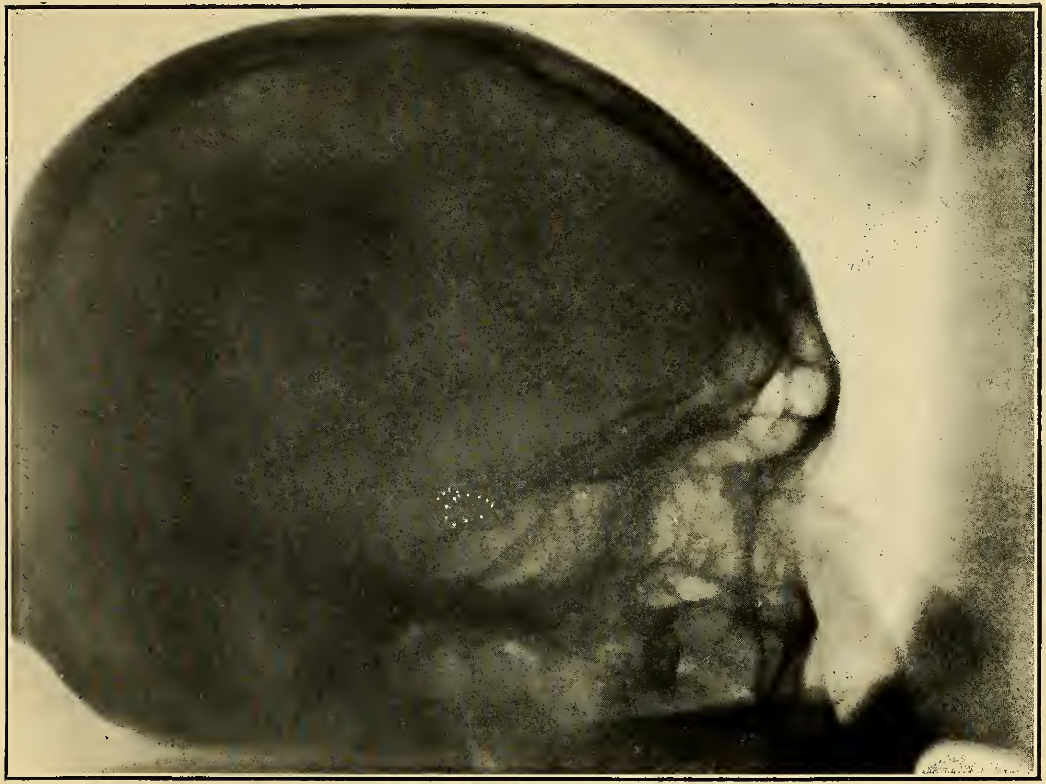
Back view of case No. 10, showing acromegalic tendency of skeletal growth.



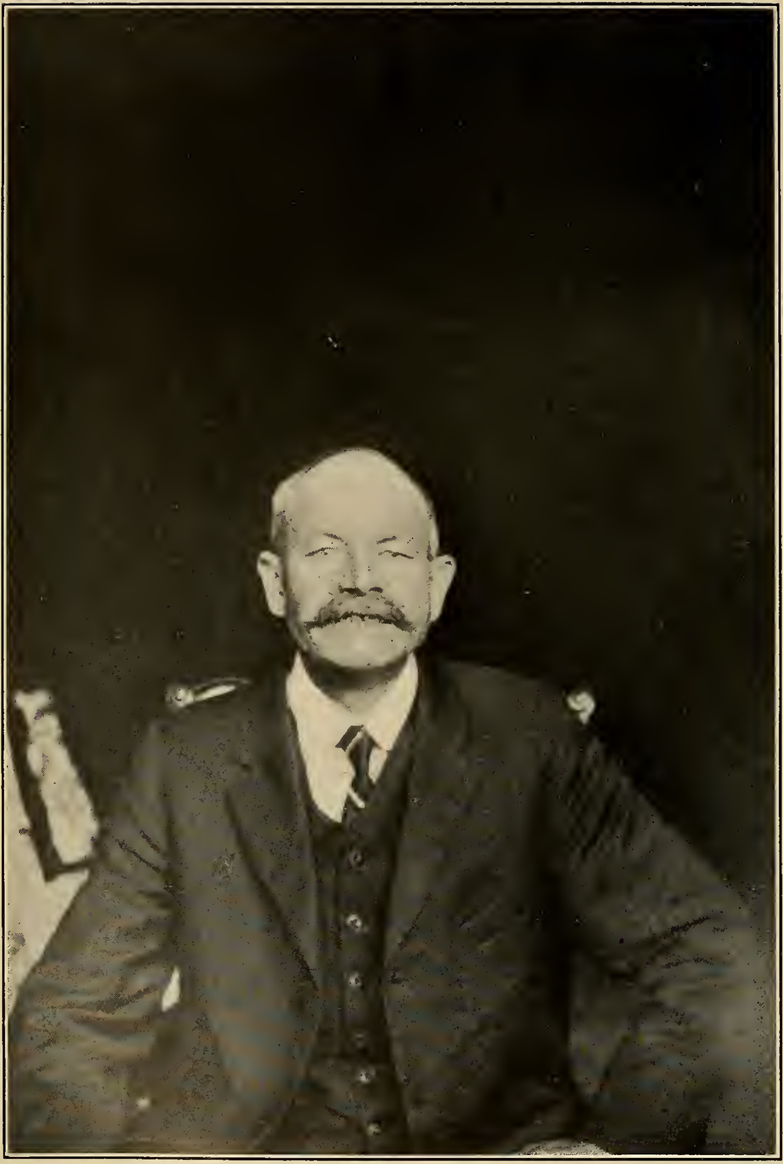
X-ray of hand of case No. 10. Note thickening of bones indicative of acromegaly. Taken and interpreted by Dr. Geo. E. Pfahler.

vertebra. A number of large inflamed zones over back where injections of some unknown substance had been given by a former physician. Buttocks completely covered by zones of inflammation and large nodular indurated spots caused by these same injections. This condition made it very difficult to find spot for injection of solution. Lost station (Romberg sign); Argyll-Robertson pupil; lost knee jerk. Areas of anesthesia and paresthesia of hands, arms and legs; hyperesthesia of back. Absolutely unable to stand or walk without assistance. Blood pressure 90 m. m. Injections given daily up to September 9th. Patient is able to stand alone with eyes closed; to walk without assistance and to walk up steps with arms folded or hands in pockets. Temperature normal; strength greatly improved; tendency to strangle entirely disappeared. Nodular indurated spots of gluteal region almost entirely gone. Nerves quiet and expresses himself as in better condition than at any time within the last four years . This patient is a striking example of pituitary and thyroid insufficiency.

Case No. 10. April 1, 1913. Age 48; occupation farmer. Married 20 years; one child 19 years old. Family history good throughout. Previous history. Syphilis twenty-seven years ago; gonorrhea about same time. Twelve years ago noticed constriction around chest. This gradually descended to waist. Then developed lightning pains in arms and legs. Was treated for rheumatism. Experienced difficulty in starting or in holding urine. Eight years ago noticed inability to walk in dark and commenced staggering while walking in street. Numbness developed in fingers five years ago. Little finger of right hand was first affected. Suffered from intense headaches for years and occasional nose-bleeds. Present condition. Walks with difficulty with use of cane and assistance of nurse; incontinence of urine and partial incontinence of feces; has to wear urinal. Appetite good, sleeps well; inclined to be nervous; is impotent, asthenic; numbness of extremities up to waist. Unable to determine position of legs and feet in bed and cannot distinguish between tiles of bathroom floor and carpet. Examination. Tall man, 5 feet 11½ inches. Light complexion; light blue eyes; thin fine hair; bald head; cervical and upper dorsal kyphosis and lumbar lordosis. Large bones; angular conformation; large hands with broad fingers, and large feet; small head; thick leathery skin; prominent frontal region; high cheekbones; prominent larynx; thyroid impalpable. Signs of muscular atrophy. Thoracic and abdominal region negative. Loss of station; Argyll-Robertson pupil; lost knee-jerk; very ataxic; lifts his feet very high when attempting to walk; areas of anesthesia in hands, arms and legs. Temperature normal. Blood pressure 95 m.m. This case, in the author's opinion, is one that was originally hyperpituitaryism and has gone to a destructive stage, producing at present dyspituitaryism or insufficiency. Treatment. Injections twice weekly to present



X-ray of case No. 10. Sella turcica seems to be completely obliterated. Note very dense appearance of skull, indicating acromegaly. Taken and interpreted by Dr. Geo. E. Pfahler.



Portrait of case No. 10, showing spacing of teeth and large jaw.

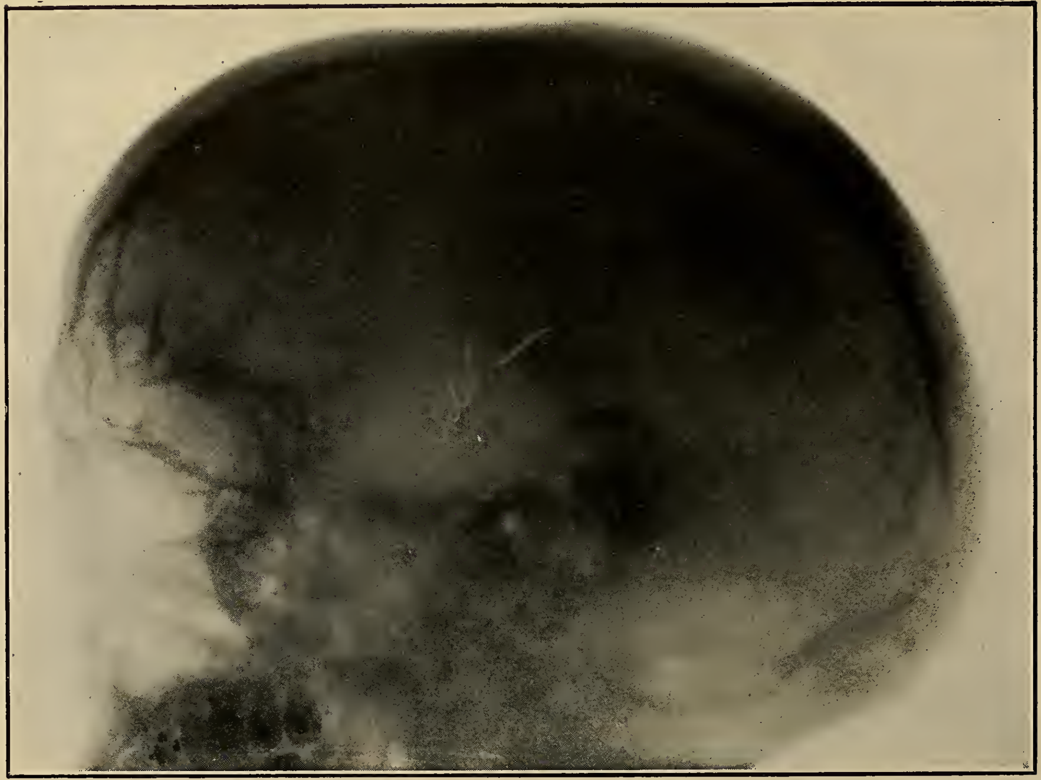
time. Patient is able to walk without any ataxic symptoms whatever.

He can walk a chalk line; walk with his eyes closed and stand with them closed. Walks up and down a long flight of steps with arms folded or hands in pockets; has discarded his cane months ago. Is able to determine position of extremities and distinguish between tile and carpet. Blood pressure now 130 m.m. Free from pain and expresses himself as feeling as well as he ever did in his life. Reflexes have not returned.

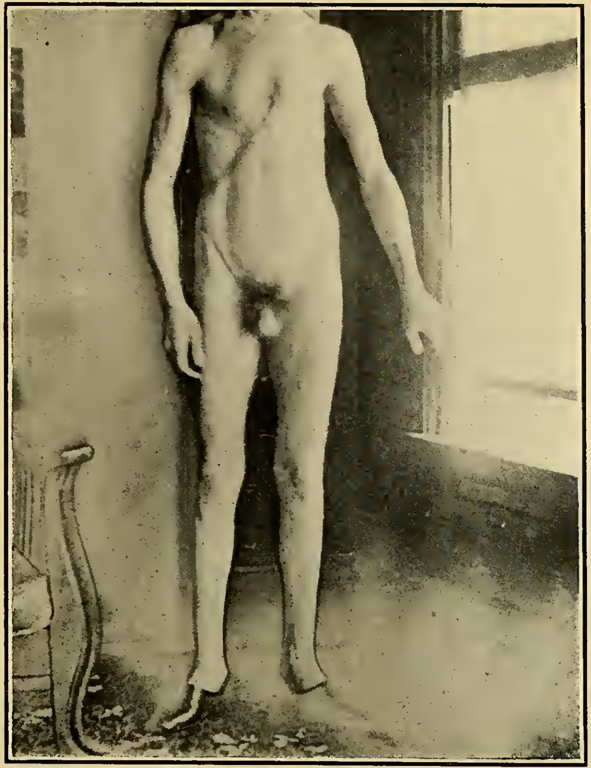
Case No. 11. May 12, 1913. Age 31; occupation merchant. Married ten years; two children, 4 and 6 respectively. No miscarriages. Family history. Father died of apoplexy at 76; one aunt died of tuberculosis. Otherwise negative. Previous history. Ordinary diseases of childhood; syphilis at 20; no other sickness. Treated syphilis by ordinary methods; has had many plus Wassermanns and salvarsan was administered twelve times at the Rockefeller Institute, New York. Not so well since that treatment. First noticed some difficulty in walking four years ago; had periods of diarrhea and difficulty in starting urine about six months before that; also had incontinence of feces (partial). For the past two years has had pains in back and legs, accompanied by contractures of toes; has muscular spasms of back; some girdle sensation; frequently has nausea and ringing in ears. Strength fair; power of concentration good. Sleeps well when there is no pain; bowels regular, but accompanied by pain. Appetite good; nerves good; no impairment of vision; impotent. Examination. Short, delicately built man of light complexion; small bones; delicate skin; blue eyes; thin hair; face delicately molded; delicate nose and mouth; small hands, tapering fingers; small feet. Sexual development below normal. Larynx not prominent; thyroid not palpable. Thoracic viscera normal, excepting cardiac palpitation, although chest is narrow and shallow. Feminine distribution of hair. Romberg sign; absolutely unable to stand without assistance; peculiar bending forward from hips and very strange spastic attitude when attempting to walk. Tendency to fall forward; Argyll-Robertson pupil; lost knee-jerk; temperature 97; blood pressure 80 m.m. Signs of pituitary insufficiency and even infantilism are conspicuous in this case. Treatment. Injections once daily for four days, at which time pupilary reflex had returned. Patient discontinued treatment. Was referred by Dr. W. J. Brandt, 251 Caroll Street, Brooklyn, N. Y.

After considerable interruption treatment was continued by Dr. Brandt and the following is a letter received from the patient on October 20, 1913:

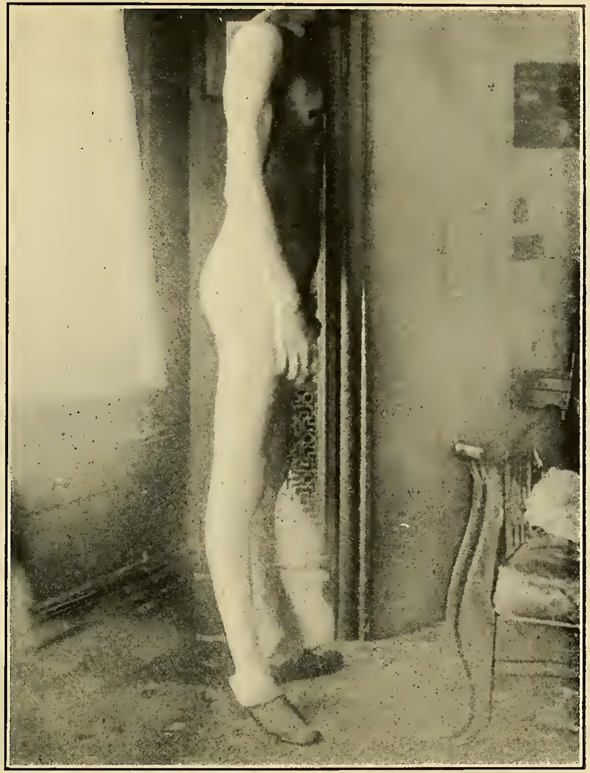
"The developments up to date are very encouraging. Upon starting the treatments, my appetite, which had completely failed me, at once began to improve and my strength appears to be rapidly returning. A few weeks ago, while going to a place about five or six hundred feet distance from my home, it was necessary for me to stop



X-ray of case No. 11. Sella turcica almost obliterated. Taken by Dr. J. G. Williams, 1136 Dean Street, Brooklyn, N. Y.



Front view of case No. 11. Note delicate form with distinct tendency to infantilism, feminine distribution of pubic hair and deficient sexual development.



Side view of case No. 11. Note peculiar attitude with tendency to fall forward. Planter reflex reported as having returned March 18th, 1914.

four times to rest and returning I required the assistance of two people. This evening I made the same trip and did not find it necessary to stop for rest either going or coming home. This after nine treatments. Let us hope the good work continues."

Case No. 12. January 16, 1913. Age 55; occupation clerk; widower. Married 16 months; one child (born dead). Family history negative. Previous history. No sickness, excepting several attacks of gonorrhea in youth, and syphilis at about age of 20. Was treated by ordinary method in use at that time. Left eye removed because of injury in 1893. Has for many years suffered from severe headaches, attacks of nosebleed, and pains in arms, legs and abdomen. Went to Hot Springs, and in addition had three injections of salvarsan. Present condition. Nervous, asthenic, pains in head, legs and arms; anesthesia of feet and numbness of hands, especially complete anesthesia of left thumb. Suffers severe pains in abdomen and has chronic diarrhea; has lost twenty-five pounds in weight in one year. Sleep interrupted by pains; appetite good. Examination. Short man, inclined to be stout; dark complexion; small head; prominent frontal region; small eyes; high cheekbones; widely spaced teeth; square jaw with prominent chin; thyroid hard and small, evidently degenerated; larynx prominent; clavicles prominent; proportionately large hands and feet; thick fingers and toes. Hair on scalp very thick and coarse and continuous with the eyebrows.

Skin coarse and leathery; Romberg sign absent; no loss of station. Argyll-Robertson pupil, lost knee-jerk; no ataxia in gait. Blood pressure 100 m.m. Sexual organs well developed; skeletal development is strongly indicative of acromegaly. In the author's opinion this is a case of primary hyperpituitaryism. Treatment. Injections once daily for two months. Pupilary reflexes returned; pains in legs and various parts of body disappeared; has had no headaches within a month. Intestinal trouble has cleared up, and patient expresses himself as in better physical condition than at any time during the previous ten years. Discontinued treatment at this time.

Case No. 13. April 26, 1913. Age 57; married 29 years; three children, oldest 30, youngest 24. Family history. Father died of heat stroke; mother cancer; one brother tuberculosis. Previous history. Ordinary diseases of childhood; syphilis 25 years ago. Noticed numbness in feet 12 years ago, and began having trouble in walking. Could walk fairly well in daylight up to six years ago. Has sharp pains in legs, especially below knees; no girdle sensation. Six years ago developed tuberculosis following grip. Was treated at Mount Alto. Appetite good; sleeps well; nerves fair; bowels constipated; asthenic. Examination. Tall man, six feet in height. Inclined to be stout with a distinctly feminine conformation of body. Round limbs and soft tissues. Hair thin; blue eyes; left eye artificial; right, cataract. Rather genial face with fairly developed underjaw and chin; small thyroid. Skin rather thin and transparent. Inclined to be verbose and slightly deficient mentally. Chest and abdomen normal. Lost station; Argyll-Robertson pupil; lost knee-jerk; marked ataxia. Temperature normal; blood pressure 120 m.m. Inclined to consider this case hypopituitaryism, because of the general appearance and conformation of the individual.

Treatment: Injections once weekly. No very perceptible results up to present time. Still under treatment.

CHAPTER IX.

Acute Diseases.

Clinical experience has shown that the polyglandular extract is of value in many acute diseases, including typhoid fever, scarlet fever, pneumonia, influenza and tubrculosis; but it is not a specific, or a panacea. The author earnestly wishes to make his views upon this subject perfectly clear. From the beginning of his work in organotherapy he has been particularly desirous to make no extravagant claims and above all to avoid starting a therapeutic fad.

Why such a remedy as this is applicable to a number of diseases will be understood upon considering its method of acting. If two persons, one robust and the other debilitated, are attacked by the same acute disease, the chance of recovery is better for the healthy person; that is, for the one whose organs are acting properly, whose metabolism is normal, whose power to resist toxins is unimpaired. Now the action of the polyglandular extract is along just these lines: to stimulate the organic functions, to normalize metabolism, to increase the body's resistance of toxins; hence the patient receiving it has a better chance of recovery. It is not a "cure-all," nor is it administered as an exclusive treatment, but in conjunction and co-operation with other rational therapeutic measures.

Brief histories are appended of a few illustrative cases of each disease treated.

Typhoid fever: histories selected from the six cases treated:

Case No. 1. Female, aged 14 years. The typhoid state was marked; temperature 105 degrees F.; pulse 140, weak and easily compressible. First injection, 15 m., given at 10 A. M. In fifteen minutes the pulse dropped to 120 beats, stronger in character; second injection at 10 P. M. reduced pulse in half an hour to 110; mental condition better. Next day, 10 A. M., pulse 100, temperature 102 F., and mental condition much improved. This patient received in all ten injections, which were always followed by decided improvement in pulse and in nervous symptoms. She made an uninterrupted recovery.

Case No. 2. Typhoid fever. Male, aged 30 years. He was in state of coma; temperature 106 degrees F.; pulse 160; marked signs of suboxidation. First injection, 15 m., at 10 P. M. reduced pulse to 140 within an hour. Second injection, 1 A. M., pulse much stronger, blood pressure increased. Third injection, 9 A. M., mental condition and nervous symptoms better and coma passing away; pulse 130, temperature 103 degrees F. Fourth injection, 10 P. M., pulse 120 and in good condition; mental state much improved. Patient recovered under ordinary treatment, without another injection, having been carried past the point of extreme danger.

Case No. 3. Typhoid fever. Male, aged 25 years, lawyer. The typhoid state was profound; pulse 140; temperature 105 degrees F.; marked suboxidation. Injection 10 A. M.; pulse dropped in an hour to 130, volume increased. Second injection 10 P. M., pulse 130, fairly good volume. Third injection at midnight, after which pulse dropped to 120, and mental condition became normal. Recovered.

Pneumonia (eight cases treated).

Case No. 1. Female, aged 10 years. Temperature 106 degrees F.; pulse imperceptible, breathing shallow; marked cyanosis; pupils widely dilated; injection, 9 A. M., of 5 m. In one hour pulse became perceptible, though thready and weak; breathing deeper; less cyanosis. Second injection, 3 P. M., improved pulse and respiration. Third injection, 10 P. M., pulse 150 and weak; temperature 105 degrees F. Fourth injection, 10 A. M., pulse 150 of good volume; cyanosis gone; mental condition much improved. Patient then went on to recovery, under ordinary treatments.

Influenza (32 cases treated).

Case No. 1. Male. Temperature 104 degrees F.; pulse 140; evidences of cardiac dilatation. Received two injections daily for six days and made a complete recovery.

Case No. 2. Influenza. Male, aged 52 years. Temperature 104 degrees F.; pulse 140, irregular and thready; asthenia; anorexia, suboxidation. Injection of 15 m. at 8 P. M. In 30 minutes the pulse became 110, of good volume. Second injection, 10 A. M., pulse became 100 and regular; temperature 101 degrees F.; signs of suboxidation disappeared. He received daily injections for four days, when he was able to sit up. He then recovered under usual method of treatment, without further injections.

Case No. 3. Influenza. Male, aged 40 years. Temperature 105 degrees F.; pulse 150, weak, thready and irregular; heart dilated; marked cyanosis; urine scanty and very cloudy. Injection 12 m.; in one hour pulse fell to 120, became stronger and there was distinct improvement in the general condition. Second injection, 10 A. M., pulse rate decreased to 100 and volume increased; temperature 102 degrees F.; patient expressed himself as feeling better. He received daily injections for seven days, at which time the pulse was 98 and the temperature normal. He felt so strong that upon the following day, against positive orders, he left his bed and went to work. Upon returning from his office he was seized by fainting spells and his condition became alarming. Examination showed that the heart had become dilated to some extent and the circulation was feeble with a weak, thready, irregular pulse. Injection of 15 m. restored the normal rhythm of the heart and increased the volume of the pulse. The patient received daily injections for three days; then semi-weekly injections for a month. At that time his recovery was complete; the heart and pulse were normal; he was able to return to work without any bad effect and experienced no further difficulty.

Scarlet fever (four cases treated):

Case No. 1. Aged 12 years. Temperature 104 degrees F.; pulse 150, compressible and thready; marked evidences of suboxidation. Injection of 5 m. at 10 A. M. reduced the pulse to 130, in an hour, and improved the mental condition. Second injection, 10 P. M., reduced the pulse to 120. Third and fourth injections followed at intervals of 24 hours, and the patient went on to recovery by ordinary treatments.

Tuberculosis (12 cases treated):

Case No. 1. Female; marked emaciation; temperature 99 degrees F.; asthenia; anorexia; constipation; sputum teeming with tubercle bacilli; hemoptysis; unable to take milk or eggs. Received injections every alternate day for two weeks, when her appetite had improved, her bowels had become regular and she felt much stronger. This patient subsequently recovered under ordinary tuberculosis treatment.

CHAPTER X.

CHRONIC DISEASES.

The clinical histories of patients suffering from chronic diseases are divided into three classes. The first class comprises those in which adynamia is the essential feature, manifesting itself in the alimentary canal as atonic and spastic constipation; in the genital system as impotence and the sexual neuroses of the unmarried; and constitutionally in the functional and progressive debility of old age.

Constipation (selected from 129 cases): Case No. 1. Female, aged 40 years, obese with pendulous abdomen. Intestinal atony. She had not had a normal movement of the bowels for over twenty years. Received injections once weekly for three weeks, when bowels became regular.

Constipation: Case No. 2. Male, aged 25 years, very neurotic. He had headaches, insomnia and spastic constipation, the feces coming away in small hard masses. Received semi-weekly injections for one month, when the action of the bowels had become normal and he was sleeping and eating well. These cases of constipation show the remarkable equilibriating effect of the polyglandular solution.

Impotence (136 cases treated): Case No. 1. Male, aged 38 years. Married ten years; no children; erectile power entirely gone, which was a source of great vexation and humiliation to him and the cause of domestic unhappiness. He had been attached to the embassies in St. Petersburg, Vienna, Berlin, Paris and London, in all of which places he had sought relief without avail. The spermatozoa were in a state of cystic degeneration, the heads showing vacuoles. The semen was yellowish white, about the consistence of thick cream with some more fluid material. He received injections daily for eight days, then semi-weekly for a month and then once a week for nine months. After ten injections he expressed distinct improvement in sexual power, greater mental and physical vigor and a feeling of well-being, which caused much pride and satisfaction. He now has a child which resembles him. The treatment was begun two years ago.

Impotence: Case No. 2. Male, aged 76 years, recently married. The man was very feeble both mentally and physically and had been wholly without sexual power for twenty years. He received daily injections for four weeks; then weekly injections for six months. After twelve injections there was a notable improvement in mental and physical force and after twenty had been given his sexual power returned to a great degree. Indeed, it was almost troublesome on account of the frequency and persistence of erections.

Sexual Neuroses of Celibacy (21 cases treated):

Case No. 1. Male, aged 27 years. He was in a constant state of sexual excitement, which was aggravated by riding on street cars. It caused him much anxiety and distress. There were nocturnal, seminal emissions; phosphaturia; muscles, soft, flabby and easily fatigued. Injections of 15 m. were given semi-weekly for two weeks followed by aggravation of the symptoms. The treatment was suspended for two weeks, then resumed, 5 m. being given weekly, raising it to 10 m. in four weeks and to 15 m. in six weeks. The persistent sexual excitement was relieved and the seminal emissions, which had been occurring nearly every night, became infrequent, not more than one in a month. He gained in strength and the phosphaturia disappeared.

The second class of chronic diseases comprises disorders, in which besides a certain degree of adynamia, there exists a toxemia of some kind as an underlying cause, thus bringing into play the antitoxic action of the polyglandular solution. This class includes epilepsy, chorea, paralysis agitans, rheumatism and arthritis deformans.

Epilepsy (12 cases treated): Case No. 1. Female, aged 60 years. She suffered from grand mal since childhood, often having two attacks in one day; was also syphilitic and had chorea and religious monomania. Weekly injections were given for a year. After eight injections she showed marked improvement, the epileptic attacks occurring only once in three weeks and the choreaic movements being much reduced. Her mental condition was much brighter. After four months' treatment, the epileptic attacks came on only once in seven or eight weeks and all other symptoms showed amelioration. At this time she fell, breaking both tibia and fibula of right leg, and suffering from severe shock. The fractured bones united; but hypostatic pneumonia developed and she died at the American Hospital for Diseases of the Stomach. There had been no convulsions for three months prior to her death.

Epilepsy: Case No. 2. Male, aged 33 years. His general nutrition was above the average, but he perspired profusely upon the slightest exertion; epileptic attacks of from five to thirty minutes occurred almost daily; there was also palpitation of the heart. Semi-weekly injections were given for one month, then weekly injections for six months. The epileptic attacks ceased entirely; the cardiac palpitation and the profuse perspiration also wholly disappeared. This result was affected by the extract without any other treatment.

Case No. 3. March 24, 1910. Age 14. Family history: Father and mother both decidedly neurotic; one aunt and one uncle died in insane asylum. Otherwise negative. Previous history. Always a delicate child from earliest infancy; developed epilepsy at 3½ years; was subject to attacks of petit mal, which occurred as frequent as 150 per day and made it impossible for him to go unattended. These attacks persisted and finally at the age of 10 he began having attacks of grand mal in addition to petit mal. Grand mal attacks occur at present about twice or three times weekly. Petit mal attacks so frequently that they can scarcely be counted. He is rather well developed and inclined to be stout; very round form, soft and flabby with an irritable temper and contrary disposition. Sexual organs very small and incontinence of urine, troublesome symptom necessitated wearing urinal. Injections twice weekly for six months. At the end of second month considerable improvement in general condition appeared; the mentality became brighter, incontinence disappeared and the attacks of petit mal became very much less frequent. At the end of the second month the attacks of grand mal occurred only about once in two weeks and those of petit mal not more than once in two days. At the end of four months the patient was practically free from the petit mal attacks and only had grand mal about once in three weeks. His general aspect was markedly improved; became much more tractable and his mental condition brightened. At the end of six months he had not had an attack of either petit mal or grand mal for more than four weeks. (This patient, at the last report, had not had an attack for two and a half years of either petit or grand mal.)

Rheumatism (21 cases treated): Case No. 1. Male, aged 29 years. Chronic articular rheumatism of right knee with pain, swelling and some crepitation; unable to walk without a cane; condition had lasted four years.

Semi-weekly injections were given for three weeks, then weekly injections for two months. There was entire restoration of function and cessation of pain.

Case No. 2. Aged 60 years. Acute rheumatism in right shoulder with great swelling, tenderness and redness. He had poor appetite and was unable to sleep. Injections given daily four times; then weekly for three weeks, when all the symptoms had disappeared.

Arthritis deformans (16 cases treated): Case No. 1. Male, aged 60 years. Emaciation; insomnia; rigidity of spine; fixation of arms and legs; deformity of both hands; patient unable to feed himself. Semi-weekly injections for three weeks and weekly for five months. The patient was decidedly better in every way. Able to feed himself and to walk about the house.

Arthritis deformans: Case No. 2. Female, aged 45 years. Deformity of hands; rigidity of all joints; unable to walk or feed herself. Daily injections for six days; semi-weekly for four weeks; weekly for nine months. The patient is now able to feed herself and to walk out of doors. The deformity of the hands is distinctly lessened.

Paralysis agitans (3 cases treated): Case No. 1. Male, aged 62 years. He had been unable to transact business for two years; had constipation; melancholia; decided tremor of hands and forearms; masklike stare; festination. Received weekly injections for six months. Marked improvement in carriage, facial expression and mental state; slight decrease in the tremors. The bowels are now normal and the sleep good. He has resumed business, but is still under treatment.

Paralysis agitans: Case No. 2. Male, aged 60 years. Has been ill for years; constipation; anorexia; mental depression; asthenia; marked tremor and festination. Received weekly injections for three months with palpable improvement in general condition, appetite and strength; but the treatment had not affected the tremor or festination, when the patient ceased coming to the office.

Paralysis agitans: Case No. 3. Male, aged 50 years. Slight tremor in hand, but not of arm; "pill rolling motion"; appetite good; bowels regular; strength fair. Weekly injections for six months, when there was improvement in all symptoms and the patient expressed himself as feeling unusually well.

Chorea (4 cases treated): Case No. 1. Aged 9 years. Diphtheria one year previously. Anemia; constipation; spasmodic movements of face, arms and hands. Received semi-weekly injections for three months, when the abnormal movements had entirely ceased. The child gained twelve pounds in weight, sleeps well, has regained color and is free from constipation.

Chorea: Case No. 2. Male, aged 9 years. Marked distortion of face; movements of arms, legs and entire body; unable to sleep; appetite and bowels normal. Received six semi-weekly injections; then three at weekly intervals. The movements wholly disappeared; the child gaind five pounds in weight and was able to return to school.

The third class of chronic diseases comprises disorders of menstruation, amenorrhea and dysmenorrhea due to anemia and general delibity; menorrhagia and metrorrhagia, due partly to these conditions and partly to uterine diseases, and hysteria associated with functional exhaustion and irritability of the nerve centers.

Amenorrhea (17 cases treated): Case No. 1. Aged 18 years. Anemia, hemoglobin 60 per cent., red corpuscles 2,300,000, white 7,200; anorexia, constipation; insomnia; asthenia. Semi-weekly injections given for three months, when menses reappeared. Injections continued three months longer; menstruation regular; hemoglobin 100 per cent., red corpuscles 5,200,000, white 8,000; appetite good; pulse normal; gain of twenty pounds in weight.

Dysmenorrhea (137 cases treated): Case No. 1. Aged 32 years. During past six years was obliged to go to bed during first four days of each menstrual period and had made a practice of taking opiates to relieve the suffering; marked constipation. Received weekly injections for six months. After first month pain disappeared and after third month all symptoms entirely ceased; bowels regular and appetite normal.

Menorrhagia (128 cases treated): Case No. 1. Aged 30 years. This patient had been curetted three years ago, at which time she had been menstruating from ten to twelve days. Received semi-weekly injections for three weeks, then weekly injections for three months. The flow became normal, lasting four days and recurred regularly for the same period.

Metrorrhagia (29 cases treated): Case No. 1. Aged 37 years. She had a fibroid tumor of the uterus and was treated to palliate her symptoms with a view to radical measures subsequently. She was losing blood nearly all the time and had grown very anemic and weak. She was given ten daily injections and, as they greatly benefited her, they were continued once a week for three months. At that time all the symptoms had disappeared except the tumor, and the patient felt so well that she would not consent to a surgical operation. See also cases under "Disorders of Metabolism Manifesting Themselves by Disturbances of the Female Genital Tract."

Hysteria (15 cases treated): Case No. 1. Aged 30 years. She had well-marked convulsions, accompanied by a chill and by a sense of impending danger; but not by loss of consciousness. Her excitability was worse during the menstrual periods, which were very exhausting, as they lasted usually eight days, and during all that time the flow was abnormally profuse. She had anorexia, constipation and asthenia. Injections of 15 m. were given daily for three days, then weekly for three months. After the third injection the patient began to gain self-control and to overcome the sense of fear, which had distressed her greatly. At the end of one month her nervous condition showed great improvement and the menstrual flow became normal, ceasing upon the fourth day. The patient had altogether fifteen injections and now, after the lapse of over two years, her general health, including her nervous system, is normal. She expresses herself as being entirely well.

Hysteria: Case No. 2. Aged 55 years. This patient's neurosis took the form of extreme excitability bordering upon mania. A physician was summoned to attend her son, who had met with an accident, and the mother threatened to shoot the doctor if he failed to cure the lad. A narcotic was administered to quiet her violent excitement and subsequently she received an injection of 15 m. daily for eight days; then semi-weekly for three weeks and then weekly for eight weeks. At the end of this period her mind was fully restored; she was calm and reasonable; competent to conduct her household affairs and care for her children.

Hysteria: The following cases were treated by a Western physician and the histories here are given unedited:

Case No. 3. Female, 25 years old, about 54 inches tall, weight 85 pounds. Kyphotic from early childhood, the kyphosis developing more during the years 9 to 11. Nervous since very young, with spells of so-called "nervous prostration" several times, first time when she was about 16 years old. Married when 18. First child (now

6½ years old) was born, after an induced interruption of the pregnancy, when she was eight months pregnant; forceps used. Pregnant with twins shortly after. Pregnancy interrupted when she was seven months pregnant, through a Cesarean section. Both babies born dead. This seems to be the one extremely painful mental impression which has governed most of her pathological nervous symptoms since then. She is always thinking of these two dead babies and when she gets nervous or hysterical seeing or hearing them will always play an important rôle. Miscarriage in 1909.

Besides the spell of "nervous prostration" in 1904 (mentioned above), which was very severe and lasted several months, she has had one of six weeks' duration in 1907, one in 1909 and one in 1911, each lasting about five or six weeks, and the symptoms present seemed to be very nearly like the ones observed during the present illness.

I saw her first in October, 1912, and during the first two weeks of my treatment she was continually in a condition very similar to coma; for days at a time it would not be possible to rouse her to answer or take nourishment. Unconscious, sleeping, not moving any limb, not being able to swallow or able to tell about her needs, breathing and heart-beat would be her only expressions of life. Reflexes were normal. At other times she would be half-conscious, complaining of severe headaches (clavus), pain in the heart region or in the pyloric region, sometimes having regular spells of increasing pain in one of these places, at the climax of the pain lapsing over in the completely unconscious stage. Lungs, heart, bladder, kidneys and every other organ I could examine was normal; blood pressure (Mercury) 105-110 m.m.; Hemoglobin (Tallquist) 85 per cent.

On the suspicion that it might be hysteria, I tried, during one of her semi-conscious periods, suggestion in the form of information to her husband, during her presence, about what would happen after a hypodermic injection. She took the suggestion promptly and since then every symptom she has had, has arranged itself nicely under the diagnosis of hysteria. Suggestion has not been further employed in any form. During the following months she has shown almost every text-book sign of hysteria: severe hysterical pains without recognizable foundation, clavus, globulus, irregular anesthesia of the skin, extreme "ovarian tenderness," aphonia, opisthotonos, retentio urinæ (five days with no ill after effects), refusal to eat for five to six days at a time; extremely rapid breathing with normal frequency of pulse; temperature was always normal.

The severest and longest lasting symptom was a complete hysterical insanity developed about the first of January after she had fallen out of the bed and hurt herself some (insignificantly though). She would imagine and convince herself that there were strangers in the room, in closets or under the bed, or in the hall outside the room. She heard them move and got scared. Soon after she commenced hearing voices, supposedly the same people talking to her. She was told that her child was sick, injured, killed and buried, and she even heard him scream outside the house at the time of the supposed accident (he was 15 miles away at the time). The boy had to be sent for and even after he had come to stay in the house it was hard to convince her that he was not dead. At other times she would hear people of her acquaintance telling lies about her, criticising her acts and most private affairs, making false accusations against her. These voices became stronger and stronger, more and more annoying and the character of the words used would be continually more insulting. She heard them all day and all night for a long time. Her husband, the nurse and the doctor would say things to her of the most provoking nature, in which obscene accusations played an important part, and no explanations of ours would be able to remove the impression that these voices were actually heard and the words actually spoken.

My treatment necessarily had to be symptomatic and tonic. She improved some under a two weeks' stay in a sanitarium, where (as also later) a relative rest-cure treatment was applied. High frequency currents and massage would apparently give some temporary relief, but were given up again at the time the paranoia developed. All medicine excepting possibly hyoscine (1/200 grain to produce sleep) seemed to be without effect. I used valeriana, bromides, veronal, digitalis, strychnin and minute doses of morphia, etc.

Since January 25th I have given in all ten ampoules of your polyglandular extract and from the same time withdrawn all other medication and treatment except rest in bed. I have given half the contents of one ampoule at a time, at first every three or four days; later on every five or six days, considering half an ampoule to a person of her weight an average normal dose. She was at her very worst when I started this treatment and in the course of two or three weeks changed completely, getting rid of one symptom after another until now, when her weight is higher than ever, her bodily health decidedly better than her husband has known it to be during the last seven years, and the only thing remaining from her illness is that once in a while yet she will hear voices, which she knows not to be real. She is doing a great part of her own housework again. The backache and headache, of which she has complained all the time of her married life, have not been present for the last month or more. She does not remember anything from the time of the paranoia.

As she did not know and never since has been told about the expectations I had of the injections of your extract, suggestion seems to be excluded as having any part in the improvement.

(Signed) SOREN NIELSON, M.D.

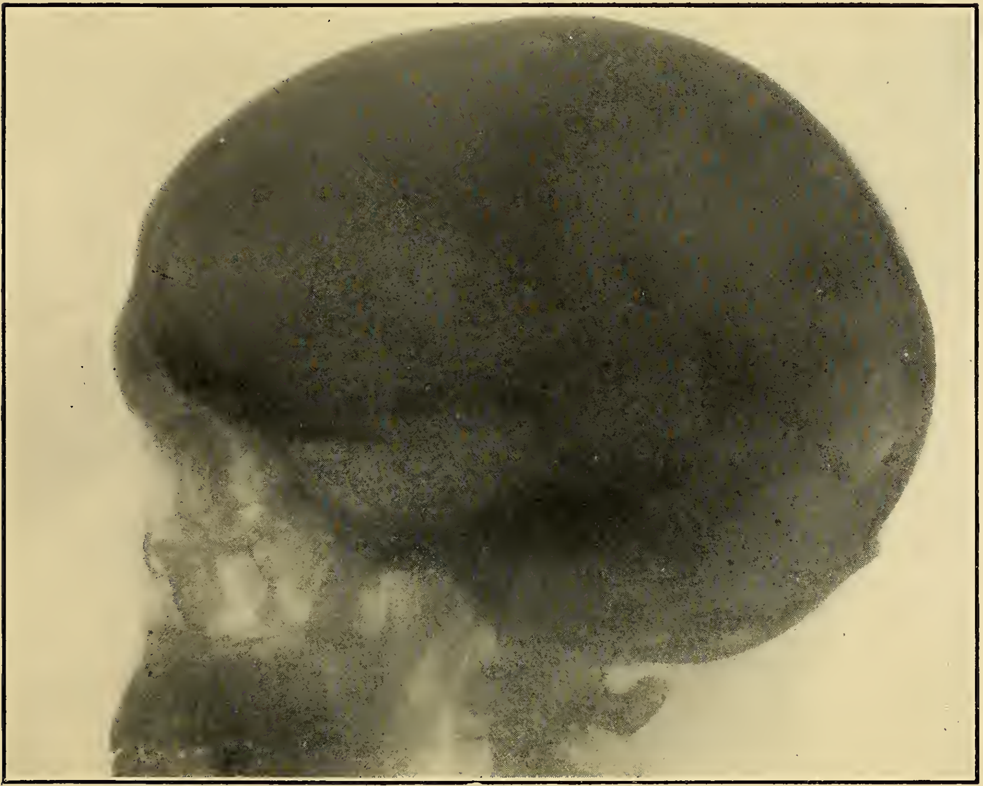
Case No. 1. Male, 32 years old. Father 65 years old, healthy. An uncle, father's brother, has myxedema. Mother during the last 17 years has been paralyzed in both lower extremities, the paralysis coming on immediately after an acute febrile disease, possibly polyomyelitis, when she was about 40 years old. The rest of the family, including eight sisters and brothers, healthy. Ancestors, Danish farmers, healthy, with hardly any possibility of having had lues.

The patient while a child had morbilli and pertussis. Otherwise never sick before this disease developed. He never tasted alcoholic liquor, nor tobacco, nor (with a single exception) coffee. Never had sexual intercourse, never masturbated. Had pollutions without any accompanying pathological feature.

Went through high school and three years of college, working on a farm during summer. Since then always farmer. In the summer of 1903, after a day of very hard work, his hands and forearms felt aching, sore and numb, and the pain kept him awake at night. From this time his present disease seems to have developed. Every time he has been doing hard work since then he has had this same feeling of aching, soreness and numbness of hands and forearms.

In the winter of 1908-1909, one day while he was "breaking" a colt to make it used to plowing, he strained himself by a too sudden movement and felt "like something popped or snapped in the back," at the place corresponding to vertebra lumbalis II. There was some pain, but otherwise no immediate consequences. A few months later he noticed that after running, his legs above the knees would get abnormally tired and below the knees tremble. Sometimes, while running, his legs suddenly would feel heavy like there was a big load tied to them, his knees would weaken and he fell. Ever since, when he has been running, this would repeat itself. When walking and getting tired the same thing would happen. About this time he noticed that he could not stand with closed eyes and walked unsteadily in the dark. His eyes got tired, when he was reading, and there seemed to be a cloud in front of them. During the summer of 1909 he was treated for a diarrhea and ever since he has been constipated. A nerve disease of unknown nature was found by his doctor and he consulted a specialist, Dr. M., in San Francisco, who, unable to make a diagnosis at the time, expected a sclerose en plaque to develop.

With the exception of the pain in hands and forearms he has never had any pain with his disease. Once in a while he would feel something like a stream of blood suddenly "shooting" from one temple to the other, but he does not call that a pain. Never any headache. At the time his abnormal sensations in the legs first commenced he would feel a kind of girdle sensation, a feeling like the muscles around his abdomen were tense and could not be relaxed. Also a feeling of something like fur between his soles and the floor when standing. He



X-ray of case No. 1, showing small and indurated sella turcica.

has always been very fat. At 20 he weighed about 260 pounds. Now about 250. Always been a good eater, but never extremely so.

I saw him first time in February, 1911, and found him healthy looking, although rather fat. Skin naturally colored with no cicatrixes anywhere. A slight acne exanthema since his constipation commenced, but no sign of any syphilitic exanthema. Genitalia normal. Speech normal. Eyes natural looking, with normal pupils and normal reflexes of these. Ophthalmoscopy shows normal retinas; vision normal 6/6 or even 6/4½. Nystagmus or exophthalmus absent. Sensation in regard to touch, pain, heat and cold normal. Stereognostic sense normal. No intention-tremor. There is increase in the strength of the tendon reflexes (patella and Achilles tendon), which are of equal strength on both sides. Clonic and long-time lasting contraction of Achilles tendon ankle clonus easily produced. Plantar, Cremaster and Umbilical reflexes are present and of equal strength on both sides. Babinsky's reflex is present. Romberg sign is strongly pronounced. One or two seconds is all he is able to stand with closed eyes. The knee-joints are curved back so much that it is impossible for him to stand with his heels close together. The spinal column apparently normal, excepting for a slight tenderness on the ninth dorsal vertebra and second lumbar vertebra. Heart and lungs normal. Abdominal organs normal. Urine cloudy with white cells and coli bacilli. There is pollakiuria and some difficulty in retaining the urine. Excepting that I gave him some advice about his constipation and cystitis, I did not at that time undertake any treatment. In the spring of 1913 he came back and I found him in every respect very much the same except that his gait, which in 1911 was purely ataxic, now was spastic ataxic to such an extent that he made an enormous noise hammering the floor with his soles when walking. Before he had been able to walk quite a little distance every day, but after an attack of influenza in January, 1913, he had been very much less able to control his legs and walked not more than a half a mile any day.

From April 1st until May 15th I gave him 11 injections of your polyglandular extract, at intervals of four or five days. During this time his blood pressure dropped from 155 m.m. to 132 m.m. and since then has always been 130-135 m.m. After the first four or five injections there was a decided improvement in his gait, the spastic element gradually disappearing. He walked easier, and got less tired; soon he walked almost as well as two years before, but as the injections continued the improvement, although steady, was less rapid than after the first few injections.

Since May 29th I have given in all 48 injections, mostly every day or every second day (with a few longer intervals). June 1st I have noticed that a sensation of spastic contraction in the muscles of the legs is commencing to disappear. The urination is easier started than before.

June 4th. "To-day for the first time my legs again feel like they were my own." Romberg sign shows improvement. He stands unsupported 15-30 seconds, but swaying quite a little yet.

June 10th. Standing about one minute with eyes closed.

To-day, August 18th, his general condition is an absolute improvement over what it was when we started treatment. But his restoration to health, if it is possible, seems to be a long way off still. He seems encouraged though and wants to continue as he thinks that he is still improving some every week, and this is the first treatment offered him since he got sick, that has been able to accomplish any results at all.

He knows that the diagnosis is uncertain and the treatment is comparatively a new treatment, but he is willing to take his chance.

(Signed) Soren Nielson, M.D.,
Hayward, Cal.

Hypothyroidism.

Case No. 1. January 31, 1913. Age 52; occupation physician; married; six children. Family history: Father died of apoplexy; two uncles and two aunts died of T. B.; otherwise negative. Previous history: Ordinary diseases of childhood; malaria at 35 very severe and second attack in 1898. Was injured in same year while playing baseball, struck in right lumbar region. Confined to bed six weeks; no other sickness. Present condition: Asthenia, inability to walk without use of two canes; very easily exhausted; inclined to fall on face; impaired speech. Pain and lump develops in left lumbar region, on exertion has pain in region of heart. Examination. Very pale, lardy complexion; obese, soft flabby tissues; hair thin and white; appearance of man 75 years of age instead of 52. This aged appearance seems to have influenced his temperament. Weight 214 pounds. Injections twice weekly for three months; experienced sense of well-being after the first injection. Slept better and was more refreshed afterward than he had for years. Improvement constant; tissues became more firm and pallor disappeared. Lost 50 pounds in weight and his mental attitude became much brighter. His ability to walk increased, so that he was able to dispense with canes. Diagnosis, hypothyroidism.

Rheumatoid Arthritis.

Case No. 1. May 17, 1913. Age 61; occupation bank president; four children. Family history. Mother had trouble with right knee; otherwise negative. Previous history. Ordinary diseases of childhood and varioloid in early infancy. Since 1902 has had twinges of rheumatism in various parts of the body, several attacks of gout in right great toe in 1911; fell in January, 1912, injuring himself in right gluteal region, which was followed by numbness of leg. Present condition. Pain in right knee accompanying occasional pain in back. Walks with cane; numbness of thigh to knee. Sleeps well, except when awakened by jumping of leg (muscular spasm evidently). Appetite good, bowels regular. Nerves poor. Upon examination, distinct crepitation noticed in movements of right knee. Right knee is considerably swollen. Diagnosis. Rheumatoid arthritis. Injections twice weekly for three months. After the first month pain in the knee became less and crepitations less pronounced. After three months no further pains or swelling.

Case No. 2. Age 64; widower. Family history negative. Previous history. Had bronchitis and asthma when a young man; otherwise negative. Present condition. Pain in elbows, wrists, fingers, knees, ankles and toes. Has had twinges off and on for the last 20 years, but for the last five years have been very much more frequent in occurrence and lately his movements are greatly inhibited. Examination shows crepitation of almost all joints. Diagnosis. Rheumatoid arthritis. Injections once daily for one week, then three times weekly for one month and twice weekly for one month. Pains lessened after first week and entirely disappeared after second. Walked with greater facility after first month, and at present walks with ease. Crepitations almost entirely absent.

Auto-intoxication.

Case No. 1. June 11, 1911. Age 39; occupation physician; married two years; one child 14 months old. Family history unusually good. Previous history. Never sick with any disease necessitating going to bed; gonorrhea at 22, which was the only sickness requiring medical attention. For the past two years has had difficulty in mental concentration and in forcing himself to perform work. Can work fairly well when once started, but lacks efficiency and is inclined to postpone; dreads commencing a new task; is in the habit of taking an occasional alcoholic stimulant to increase his energy. Sexual power somewhat impaired; occasional slight vertigo. Urinary examination shows indican in excess. Diagnosis: auto-intoxication. Treatment. Injections once daily for one week; three times weekly for two weeks and once weekly for two weeks. Energy much improved; sexual power rather above par. Patient says that his do-it-now feeling has returned and is able to meet his daily tasks as they come without flinching.

Case No. 2. April 26, 1913. Age 44; occupation physician; married; two children. Family history. Brother died of T. B.; paternal grandfather of T. B.; two cousins of T. B. Previous history. Ordinary diseases of childhood; several attacks of grip; muscular rheumatism several times; has had some lung trouble, probably tubercular; cough and night sweats; appetite and digestion poor; bowels constipated; sleeps fair, but does not rest, due to muscular contractures; nerves bad. Injections three times weekly for two months; pains in muscles and contractures disappeared; has more restful sleep; wakes up more refreshed in the morning than previously; night sweats gone. Digestion good; bowels fairly regular; feels better than he has for years. Returned to his practice and says he is doing better work than ever before.

CHAPTER XI.

DISORDERS OF METABOLISM MANIFESTING THEMSELVES BY DISTURBANCE OF THE FEMALE GENITAL TRACT.

As our knowledge of organotherapy increases, the field of the gynecological surgeon becomes narrower. The habit so long prevalent among men in treating disorders of the female genital tract of resorting to local treatment, or even surgical intervention upon the slightest provocation, especially repeated curretages of the uterus, will disappear. Many women suffering from dysmenorrhea, amenorrhea, leucorrhea, menorrhagia, metrorrhagia, and certain nervous disturbances which are attributed to reflex irritation from the ovaries, uterus, etc., are subjected to these operative procedures, which frequently avail them nothing and leave them in a condition of lowered vitality and nerve tone, which is conducive to neurasthenia and melancholia.

As our studies of the ductless and sexual glands and their internal secretions or ergonisons proceed, we are impressed by two facts: first, that no one gland controls the sexual development or activity at any given period of the development, or life, of the human organism, and, second, that diametrically opposite conditions may prevail, apparently due to the same departure from the normal of any given gland, and we are impressed by the necessity of the harmonious action and interaction of all of these organs to maintain the equilibrium necessary to health. The giant and the dwarf, for instance, both suffer from sexual underdevelopment, showing that both hyper-function and hypo-function of the pituitary may produce the same result.

The adolescent female who is just entering into puberty is subject to certain neurovascular disturbances manifested by bashfulness, blushing, self-consciousness, and erratic nervous conditions, disturbances or perversion of appetite, digestion, constipation, etc., and at the other extreme of the sexual life when the menopause or climacteric is ensuing a similar state develops. The nerves become unbalanced, the digestive tract becomes disordered and appetite erratic, etc., and the temperament of the individual is again distinctly changed. The part that the internal secretions play in the development of vital functions, of body and mind of the female, are so great and their function in maintaining the normal metabolism is so important that a knowledge of the ductless and sexual glands and their wonderful secretions can no longer be ignored by progressive physicians treating this class of patients. The pituitary gland or hypophysis is the most important organ in its effect upon the early development of the genital organs, and it is assisted by its first lieutenant, the thyroid, which plays a scarcely less important rôle in this particular matter. The interrelation between the thyroid and the ovaries has been thoroughly established by a great number of able investigators. Both mental and physical development of the child is strongly influenced by the secretions of these two glands. The height of the individual and the proportions of the body are determined to a considerable extent by the early or late development, or perfect performance, of function of the pituitary, thyroid, and ovaries. The bony growth of the adolescent, the proportion between the length of the legs and the body, is governed by a harmonious relation between these three glands. Where the sexual development and internal secretion of the ovary are precocious or unusually early, the patient is apt to have a long body and short legs, the adipose tissue is apt to be increased and the rotundity and conformation of the body, which are peculiar to the female sex, are especially marked. Where there is a retarding of the development of the ovary and of function of its secretion, the patient is apt to have long legs and a long thin body with a narrow chest, and the general conformation is angular. The hair is influenced markedly by both the ovary and the thyroid. Where the function of these organs is deficient, the hair is apt to be scanty and short, while a perfect, healthy and vigorous function produces a luxuriant and rich growth of hair peculiar to the female sex. Not only congenital peculiarities may cause retarding of the development of these organs, but pernicious habits which produce irritation of the genital tract are apt to produce the same effect, as are diseases and injuries of different kinds which have a special relation to the nervous system, or to the thyroid or genital tract. The interrelation between the ductless and sexual glands and the sympathetic nervous system is so delicate as to be very easily disturbed, and the number of causes which may produce this are very many. The exanthematous diseases of childhood, when they attack these organs, are especially apt to leave them in a crippled condition. The crippling of any one of the chain of organs has a very marked effect upon the others.

Increased function of the anterior lobe of the pituitary is usually associated with increased function of both the thyroid and the ovaries. The pancreas, the pineal gland, the thymus, and both the sympathetic and central nervous systems, all modify and influence each other, and disturbance of one of the chain frequently produces a great variety of symptoms which may be manifested through the others, especially the ovarian and uterine functions.

Some families have certain ductless gland peculiarities. Instability of the entire system may be produced in such families by thyroid disturbances or by pituitary or genital anomaly. This instability may manifest itself by either hyper-function or hypo-function. In considering the history of a new female patient the physician is careful to note the age of the patient, when menstruation was first established; whether or not it was normal in amount; whether or not the patient was nervous, irritable, subject to flashes of heat and palpitation; whether or not accompanied by pain or disturbance of the digestive tract, the regularity with which it commenced; whether or not the patient became regular from the first, or was subject to erratic periods; whether it was delayed for weeks or months, or, on the other hand, came too early. If the child was able to attend school or play and romp with the other children, we may conclude that the ovarian development was normal. On the other hand, if we find that the patient was subject to palpitation, nervousness, depression or irregularities of the time, or the amount of the flow, we may conclude that the development of the ovaries was impeded in some way. We know that increased function of the pituitary in the early stage of life is productive of full development of the sexual organs, and increased function of the thyroid has a similar effect. Incomplete development of the genital glands and of the thyroid is frequently noted in the same subject. There are other causes, such as interference with circulation, which may produce the same effect, but the most frequent is lack of function of these particular glands. Infantilism is frequently due to improper secretions of the thyroid and of the pituitary.

The involvement of the sexual organs in these types of cases is not to be confused with that form of infragenitalism which seems to be without any particular relation to the ductless gland system, but a part of a general lack of development. The ovary whose internal secretions have so marked an influence upon the functions of both body and mind of the female is probably responsible for a great many of the erratic periods of over-activity of the woman; first in adolescence at puberty, and later at the menopause. At puberty, when the ovary begins to pour its internal secretion into the economy, the thyroid awakens and its function begins to make itself manifest. At the period of the menopause the ovary ceases to perform its function and the thyroid becomes more or less sclerotic, and thus the balance which produces the normal is interrupted and the result is the erratic flashes of nervous unbalance which are so characteristic of this particular period of life. At the time of the menopause hair upon the face, which was not noticeable before becomes coarse and grows to conspicuous length and the voice is altered, assuming masculine tone. Irritability, tachycardia, etc., are prominent symptoms in both of these periods and are a manifestation of this disturbance of equilibrium. The sympathetic nervous system becomes markedly disturbed, as is shown by the peculiar erratic condition of the vascular and nervous system. Chlorosis is a disease closely associated with the ovarian function, as is also osteomalacia. While, of course, the ovaries preside primarily over the function of menstruation, amenorrhea is a prominent symptom of hypothyroidism.

Pale, fat, flabby women with lowered vitality suffering from suboxidation, asthenia, irritable nervous conditions, are examples of hypo-thyroidism and lack of function of the adrenal as well. The secretions of both of these organs determine the ability of the blood to supply oxygen to the tissues. Obesity in these patients is due to their lack of proper oxidation, and both the thyroid and the adrenals are partly responsible for the amenorrhea, improve their oxidation, increase the function of the thyroid, and the ovaries will frequently be able to perform their proper function, and menstruation will be re-established. To subject these women to local treatment is inflicting upon them an unnecessary hardship which can be of no benefit to them, as the cause of their local disturbance is not in the ovaries or uterus, but is located in the glands which preside over oxidation. This gain of weight is frequently accompanied also by a lowered function of the posterior lobe of the hypophysis and an atrophy, or lessened function of the ovary, but the thyroid is always involved in this class of cases, and must be stimulated to perform its proper function before the conditions complained of can be gotten rid of.

Menorrhagia.

Case No. 1. January 1, 1912. Age 33; married; two children eight and six years of age; no miscarriage.

Started menstruating at 12; was regular; flowed rather freely six or seven days; no pain. Six years ago was operated on for an abscess of left ovary, and after recovery was well for one year, then developed leucorrhea, menorrhagia, dysmenorrhea and was compelled to remain in bed seven days each month because of terrific flow and headache and pain. Was curetted in 1910 and again in 1911, but discharge still remained, lasting 14 days, 7 of which rest in bed was necessary. Asthenic, melancholic, suicidal tendencies, anemic, pale, thin, weight 104 pounds, suffers intensely from neuralgia, lasting from six to thirteen days each month. Sleeps poorly; bowels regular; appetite poor; very nervous and depressed. Diagnosis, neurasthenia and melancholia secondary to menorrhagia and dysmenorrhea. Injections twice weekly for four months. At the end of the first month menstruated four and one-half days; at the end of the second month, four days; at the end of the third month went to a ball the night of the fourth day, and during none of the periods while under treatment was she required to remain in bed. Leucorrhea, menorrhagia and dysmenorrhea and neurasthenia have all entirely disappeared. The patient was exhibited before members of the Philadelphia County Medical Society on March 27th, 1913. Was referred to the author by Dr. Arthur Wrigley.

Case No. 2. October 19, 1913. Age 30; married eleven years; five pregnancies; one miscarriage; four children all died within five hours after birth. Family history. Mother died at 52 of Bright's disease; otherwise negative. Previous history. Measles in early childhood; scarlet fever at 12; nervous prostration during last year at school which was at about 17. Menstruated at 15 of the 28 day type; lasted 7 days; caused no inconvenience. No other sickness following nervous attack at 17 until 1912. Had severe pain in right side followed by nervous breakdown and tremor of legs which interfered with walking and menstruation became very irregular, skipping at times three months. Present condition. Extremely nervous, peculiar sighing and tremor in breathing; very restless; sobs and cries easily; extremely melancholic; asthenia, anorexia, globus hystericus, diarrhea with some incontinence; sleeps very poorly, gets up at night and walks floor; has twitching in legs; despondent and has suicidal tendency; has not menstruated for three months.

Examination. Well developed, rather florid and stout woman, below medium height; dark brown hair and dark eyes. Blood pressure 90 m. m. Physical examination negative. Treatment. Injection 15 m. polyglandular solution. October 21st feeling much better; menstruation commenced on the 20th and is at present menstruating freely. Feels bright, cheerful and composed. Second injection, October 23d; expresses herself as feeling wonderfully well, better than in many years; entirely free from nervousness and asthenia.

Third injection. Treatment discontinued, as no further indications were present.*

Case No. 3. January 27, 1913. Age 39; married 18 years; no miscarriage; no children. Family history negative. Previous history. Ordinary diseases of childhood; erysipelas at 17; diphtheria 8 years ago; tonsillitis two or three times. First menstruated at 10½ years of age; always fairly regular, but inclined to be too frequent and severe dysmenorrhea. Flowed freely from five to nine days; has been operated on six times (curetted). Present condition. Nervous; asthenic, constipated, does not sleep well; appetite poor, frequent micturition and excess of leucorrhea. Present condition. Menstruates every three weeks for nine days. Examination. Uterus and appendages normal, except for thin slimy discharge. Treatment. Injections twice weekly for three months. After first month intervals between menstruation lengthened from three to four weeks and lasted but four days. Discharge diminished. After second month discharge completely gone, dysmenorrhea gone and menstruation four days every 28. Diagnosis, neurasthenia secondary to dysmenorrhea and menorrhagia. These cases show the futility of persistent curetting, which line of procedure the author believes is instituted in many cases where it is neither required nor desirable.

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* Note that case No. 1 and case No. 2 are of diametrically opposite conditions, yet the patients were restored to the normal, showing the equilibriating influence of this solution.

CHAPTER XII.

THE GLANDS OF INTERNAL SECRETION IN THEIR RELATION TO DIABETES.

From the earliest writings on diabetes, its etiology has been surrounded by mystery and obscurity. No definite or satisfactory explanation of its cause has ever been given. Because of the peculiar influence of carbohydrates upon the disease, the alimentary canal has been searched diligently for a cause. The pancreas has been blamed for the condition; the kidneys, the cerebellum, and liver have all in turn received the attention of the pathologist in his endeavor to locate a lesion which could satisfactorily account for the phenomena incident to this disease. However, none of these have thrown any light upon the subject that has stood the test of time. Recent researches in the studies of the glands of internal secretion, the pituitary body especially, have placed this study on a distinctly more scientific basis.

Hypopituitaryism, a condition which has but lately attracted the attention of the advanced workers in this particular line, displays a chain of symptoms which at once directs our attention toward diabetes. The polyphagia or excessive appetite, the polydipsia or excessive thirst, the polyuria and itching which are all prominent symptoms of diabetes are manifested with great precision in hypopituitaryism, but, on the contrary, the carbohydrate tolerance instead of being decreased is distinctly increased. The nervous phenomena which usually manifest themselves in diabetes are prominent features of hypopituitaryism. The sexual disturbances, amenorrhea, impotency in the male and anaphrodisia are conspicuous in both of these conditions. In some cases of hypopituitaryism there is also glycosuria. The terminal symptoms of hypopituitaryism are also very much like those of diabetes, namely, mental disturbance, hepitude, sluggish cerebration, drowsiness, peevishness, and finally a comatose condition. This similarity of symptoms is so striking that it cannot be overlooked. The only constant symptom of diabetes lacking in hypopituitaryism is glycosuria, and even that is at times present. Of course, there are many other symptoms manifest in hypopituitaryism beside those enumerated above, but most of them can be attributed to neighborhood disturbances due to pressure, for many of these cases of hypopituitaryism are accompanied by tumors of the pituitary body, or surrounding structures which interfere with function, and the pressure of these growths is responsible for many, if not all, of the additional symptoms of hypopituitaryism, and may even be the cause of the hypopituitaryism. The results that the author has achieved in the treatment of diabetes by the use of the polyglandular solution, some of which are described in outline herewith, have encouraged him to believe that this disease is indeed closely related to this system of organs of internal secretion.

Diabetes.

Case No. 1. August 7, 1912. Occupation lawyer, married. Family history unusually good. Previous condition. Ordinary diseases of childhood. In 1897 had goitre of such marked degree as to compel wearing collar 16½ inch size; now wears 14¾. Went West to Colorado Springs, and in one year goitre disappeared without any treatment, although there is some slight enlargement of the thyroid. Physical examination negative. Urinalysis shows sugar 4.93 per cent. by Purdy's method. Received injection 15 m. solution, next day received second injection after having taken second specimen of urine. Upon analysis, second specimen of urine was found to contain 7.75 per cent. of sugar. Treatment was discontinued because of this increase in amount of sugar. The patient returned to his home and against the author's wishes received injections of solution which was furnished by the author for another patient. Received 12 doses of solution at intervals of about three days under Dr. Wright, 2504 Collingwood Avenue, Toledo, Ohio, who noted a distinct reduction in quantity of urine and amount of sugar in 24 hours, as noted in the following statement by Dr. Wright:

"At the time of the first injection his daily amount of urine was 70 ounces, his sugar was 1200 grains. At the time of writing daily urine excretion was 50 ounces and daily excretion of sugar 750 grains, and his condition is very much improved in general. He is working at his profession daily and has gained three pounds in weight in 12 days." Urinalysis by Dr. Vincent Lyon, 1901 Pine Street, Philadelphia.

This statement is merely to show the possibility of relation between diabetes and the ductless glands in this case.

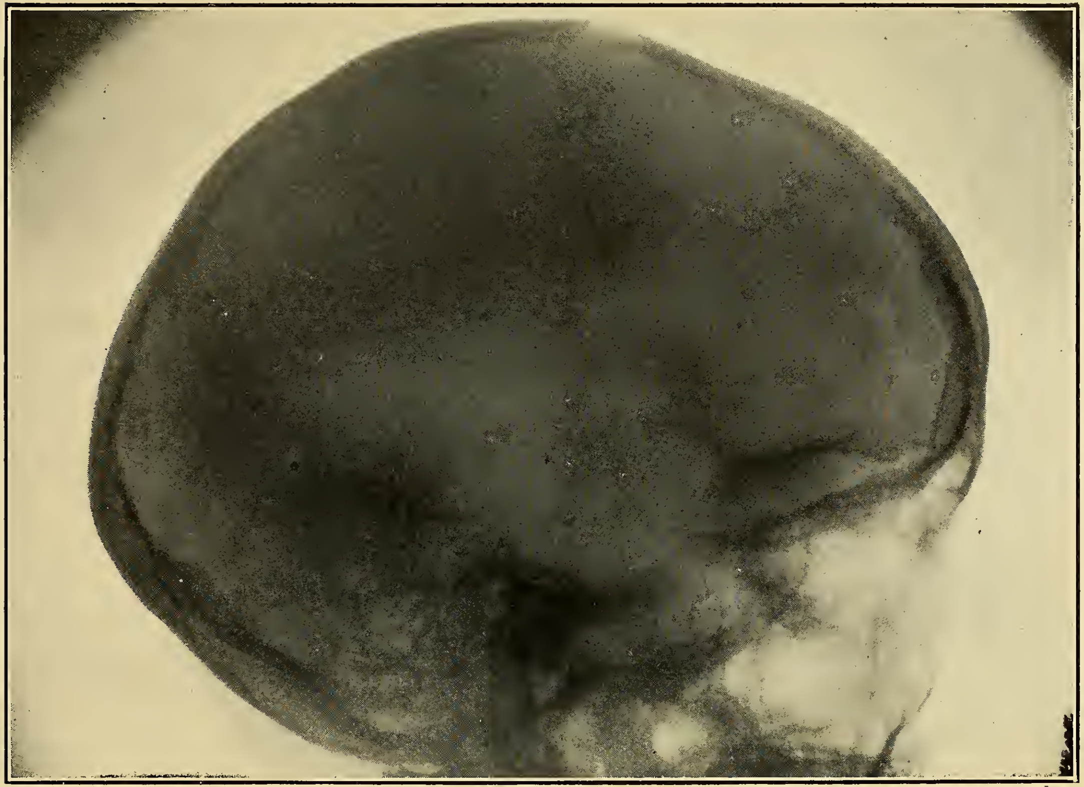
Case No. 2. June 20, 1912. Age 33; occupation clerk, married ten years. Family history: Paternal grandfather died of cancer. Previous history: Ordinary diseases of childhood. Gastroptosis diagnosed in 1906; had bad stomach trouble and vertigo; commenced passing large quantities of urine which was found to contain sugar about this time. Did not interfere with his ordinary occupation until 1908 when he began feeling extremely nervous and grew worse since. Present condition: Very nervous, asthenic; appetite poor, bowels alternating between constipation and diarrhea. Passes large quantities of urine which upon analysis was found to contain 4 per cent. sugar; total urine one hundred ounces in 24 hours. Is confined to his bed in a condition of stupor and has a dark spot on back in sacral region, due to lying in recumbent position. Left great toe very dark in color, appears to be on verge of gangrene. Placed on disintoxication treatment and given injections twice daily for the first 48 hours and then once daily for one week. Patient's condition improved after first 24 hours; mental condition brightened and amount of urine was reduced to 50 ounces and sugar to one per cent. in three days. After fourth day sugar entirely disappeared and urine remained at from 50 to 52 ounces per day. The spot on back disappeared; toe resumed its natural color. Patient was able to leave his bed in two weeks and his nervous condition quieted down. In three weeks was able to return to his occupation.

Case No. 3. July 25, 1912. Age 51; married 30 years, one child. Previous history: Ordinary diseases of childhood and typhoid at 20 years. Erysipelas 12 years ago; otherwise negative. Family history: Father died of tuberculosis. Mother died of lung trouble, also T. B.; otherwise negative. Previous condition. About ten years ago started to void enormous quantities of urine, as high as 300 ounces per day; gave strong reaction with Fehling solution. Percentage of sugar was not estimated. Marked thirst and enormous appetite. Present condition: Voiding 300 ounces of urine per day with 7.75 per cent. sugar; is losing weight and is extremely nervous; has spells of vertigo; flashes of heat and sense of suffocation. Injections given twice weekly for two weeks, at which time amount of urine was reduced to 65 ounces daily and sugar to 3 per cent. Nervous symptoms and general condition better. This patient was treated for four months, at the end of which time sugar had entirely disappeared, nervous symptoms reduced to a minimum and the itching was entirely gone. Patient gained 12½ pounds during this period and expresses herself as feeling better than she had for ten years. Her mental and physical condition and entire aspect were markedly improved.

CHAPTER XIII.

ARRESTED DEVELOPMENT.

While arrested development is not necessarily always associated with disorder of the pituitary body, it is undoubtedly closely related to it and the other glands of internal secretion, and in this connection we will speak of it chiefly from this standpoint, and will use it synonymously with infantilism, as usually understood. Peretz and Herter showed by some interesting experiments that intestinal auto-intoxication may be the only discernible cause for arrested development in some cases, but it is not at all improbable that even in these cases there is a toxin produced in the intestines which neutralizes the normal ergonison of growth which is secreted by the pituitary, and, therefore, these patients, while they may not be primarily suffering from pituitary derangement, are robbed of its stimulating influence upon their development. Irritations of the sexual organs may also be responsible for arrested development. The internal secretion of the sexual organs is poured out in abnormal amounts which influences the secretion of both the pituitary and thyroid. The sexual organs increase rapidly in size up to a certain point and the growth is stimulated, precocious puberty is established and development ceases. The patient is apt to have short legs and



X-ray of case of infantilism shown in illustration facing page 201. Sella turcica seems to be much underdeveloped. Taken and interpreted by Dr. Geo. E. Pfahler.

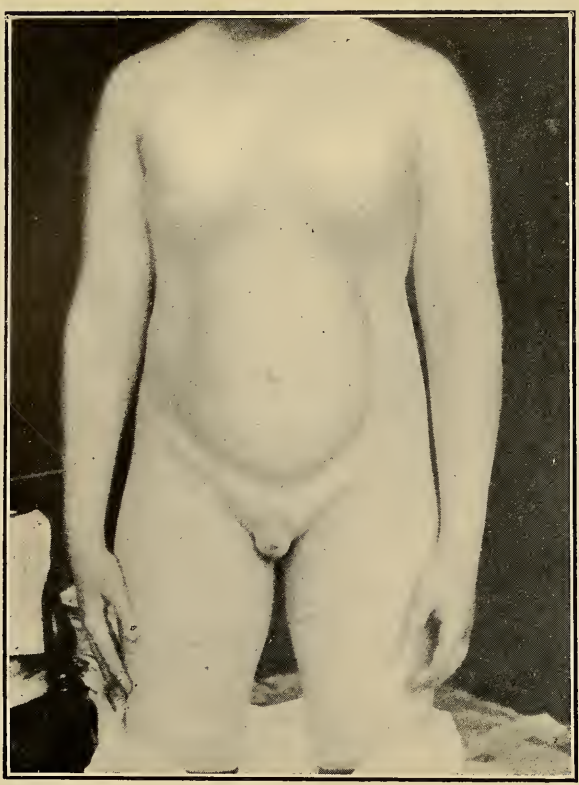
more or less square configuration of the body with the mental and nervous syndrome which is familiar to us in this class of cases. On the other hand, the growth may not be suddenly checked, in which case the individual grows tall and thin and is asthenic and apathetic.

Infantilism may be acquired before puberty, in which case the patient is short of stature, feminine in build, the hips are broad and the bones small and delicate, and the general configuration rounded, resembling the female. The voice is apt to be falsetto or high pitched. The subcutaneous adipose tissue is distributed much in the manner that it is in the female, especially prominent around the hips or gluteal region. The mentality may be normal, though it is frequently subnormal and seldom strong. The facial expression is inclined to be docile and apathetic; the skin is delicate, smooth, transparent and dry, and the temperature usually subnormal. The distribution of hair may be abundant upon the scalp, is but scanty or wanting over the rest of the body, and the pubic hair assumes the feminine type of distribution, and the axillary hair is apt to be wanting. The sexual organs remain infantile and do not develop; the hands are delicate, soft, with tapering fingers. The nails are small and thin and the crescents at the base of the nails are absent. The blood pressure is low, the pulse frequently thin and slow. The X-ray usually shows small sella turcica. The patient is frequently asthenic, inclined to be nervous and irritable. He may be bashful and diffident, or, on the other hand, have a rather exaggerated opinion of himself and be absolutely blind to his underdevelopment.

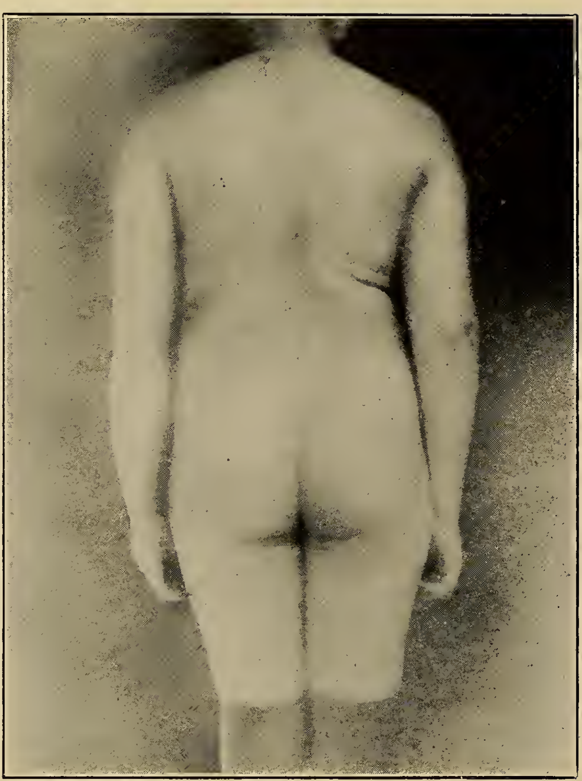
When hypopituitaryism supervenes later in life after maturity the hair usually becomes thinner over the entire body; the hair on the scalp thins out and the axillary and pubic hair becomes much less in quantity and finer in texture. The hips, abdomen and gluteal region develop adiposis, and the pelvis seems broader, giving a distinct feminine contour to the body. The mentality is less vigorous and the skin becomes thin and delicate like a woman's. Even in acromegaly, which is characterized by very coarse skin and hypertrichosis, after the stage of hypopituitaryism is established, the skin becomes less coarse and the subcutaneous tissue less boggy. At autopsy the subcutaneous fat is found to be lighter in color than the normal, which would seem to indicate a difference in chemical composition of this abnormal fat. Of course, the skeletal development is not influenced by hypopituitaryism either in the normal or in the acromegalic subject after epiphyseal attachment has taken place, and a full skeletal development is established.

Cretinism, which is a form of arrested development, will be described in a separate chapter.

Case No. 1. April 15, 1913. Age 19; occupation baker, single. Family history: All healthy, but short in stature. Previous history: Ordinary diseases of childhood; otherwise negative, except little rheumatic



Front view of case of infantilism. Note large breasts, feminine in type, feminine conformation of legs and arms and extremely deficient sexual development.

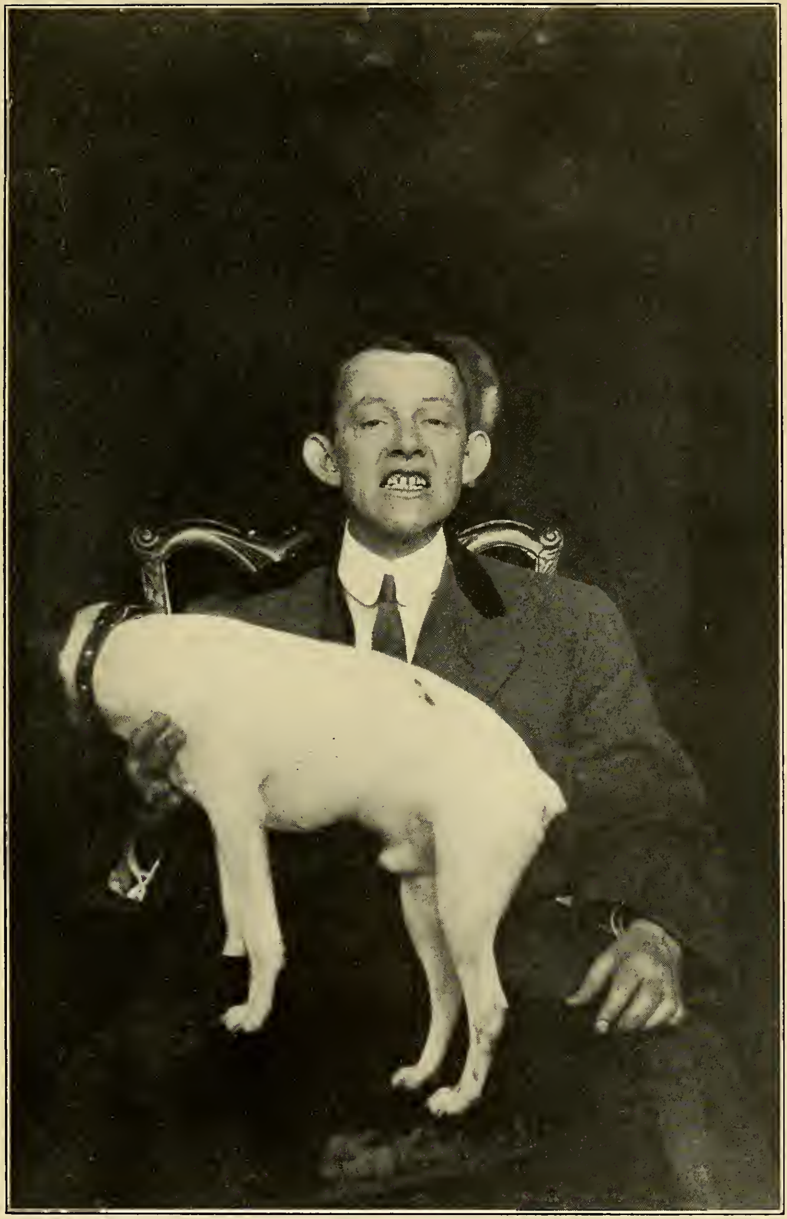


Back view of case of infantilism with reversion of sexual characteristics. Note purely feminine contour of body.

pains in right knee. Examination: Height 4 feet 7 inches; muscular development below par; weight 102 pounds; sexual organs very much undeveloped; no sign of beard on face and very little pubic hair. Diagnosis infantilism. Injections twice weekly for three months. He grew one-half inch first month and appearance became more manly; straggling hairs began to grow on face and pubic hair increased in quantity. At the end of second month had grown an inch and a half and voice assumed a deep tone. At the end of sixth month has sufficient hair on face to make shaving necessary and has grown two inches in height. His sexual organs have developed to at least twice their former size. Patient discontinued treatment at this time. Very much delighted.

Case No. 2. November 30, 1912. Age 20; single; diagnosis infantilism. Family history negative. Previous history: Ordinary diseases of childhood; no other sickness. Present condition: Nervous, diminutive, mentally deficient; looks like a boy of 14 with poor mentality. Height 4 feet 6 inches; weight 106 pounds; has always been backward in his studies and never had the mental efficiency of a boy of his relative age at any time during his life. Examination: Thyroid small, soft; penis undeveloped and testicles very small. Aspect dull and shy and diffident. Injections once daily for two weeks; then three times weekly for one month and twice weekly for six months. Mental condition commenced to improve after the first week; grew three inches in seven months, gained ten pounds in weight and assumed a normal and manly appearance. Sexual organs increased very markedly in size.

Case No. 3. October 11, 1913. Age 34; occupation printer; married thirteen years; four children. Family history. Father died of cancer of throat at 52; mother living. One brother very nervous; otherwise negative. Previous history. Ordinary diseases of childhood; appendicitis at 13; no operation. Has had headaches almost constantly since he was twelve years of age; rheumatism one year ago. For the past 2½ years has been very nervous; easily agitated; subject to trembling sensations in stomach and tremor of the hands and entire body; troubled considerably with indigestion during this period. Present condition: Has tremor of hands, arms and legs; is unable to do efficient work and is very easily flustered; despondent, morose; has an aversion for society; cannot concentrate his mind successfully on his work; memory bad; fullness and distress after eating; easily fatigued and short of breath. Has distressed feeling in back of neck and frequent lumbago; tender spots along spine. Sleeps poorly; frequently has dreams of an extremely gruesome nature; appetite poor; bowels constipated. Has been under constant treatment for almost his entire life with different physicians, but without avail. Examination: Small, well-rounded man, 5 feet tall; pale, sallow skin, sunken cheeks; widely



Portrait of case No. 3, arrested development, showing wide spacing of teeth.

spaced teeth. Examination of chest and abdomen negative. Sexual organs underdeveloped. Treatment: Injections of polyglandular solution twice weekly until January 7th. Experienced a feeling of increased vitality from the first injection. Insomnia disappeared; appetite became normal; bowels normal; tremor entirely gone; able to concentrate on his work and is much more efficient than ever before. Expresses a decided feeling of well-being and is extremely cheerful. Appearance of face markedly changed; hollow cheeks have plumped out and is now a vigorous and healthy looking man.

CHAPTER XIV.

GOITRE.

In considering the diseases of the glands of internal secretion in which the thyroid is the organ most conspicuously involved, we must consider, as in all other cases of ductless gland disease, first, conditions where hyper-secretion is the morbid process, and later, conditions in which secretary deficiency or hypo-secretion intervenes, and is the cause of the pathological phenomena and the symptom complex. We will, therefore, commence by discussing goitre, which is the most conspicuous example of thyroid hyper-secretion, and end with myxedema and cretinism, which are examples of the reverse or hypo-secretion. Besides the name of goitre this disease is known under several other names, among them being bronchocele, because of the swelling present in the throat; Derbyshire neck, applied to it because of its prevalence in and about Derbyshire, England; Graves' disease, and Brasdows' disease, because these physicians were the first to accurately describe it; the term of exophthalmic goitre is correctly applied to a special form of goitre in which bulging of the eyes is a conspicuous symptom. The thyroid gland normally varies in size in different individuals, especially in the female, and is, as stated above, physiologically enlarged at the catamenial period and in pregnancy. Cases of goitre have been reported in which the gland was so enormously enlarged as to hang down upon the chest or even to the thighs.

The signs of goitre usually appear early between the eighth and twelfth year, but remain quiescent until about the age of puberty, when a sudden quick enlargement takes place, showing the relation between the sexual glands and the thyroid. At first the growth is a simple enlargement of the normal tissues, but later fibrous or cystic changes take place in it. The shape at first may be symmetrical, but as a rule one lobe is more involved than the other, and in cystic cases it is nodular.

The fact that goitre is due to over-activity of the thyroid has not always been acknowledged. In fact, there have been various theories offered in explanation of this syndrome. Among them it was thought that it is due to disease of the medulla oblongata; that it is due to a disturbance of the sympathetic nervous system, and again that it is due to a disturbance of the central nervous system. Although the various nervous complications which are present in this disease give justifiable ground for attributing the disease primarily to a nervous disturbance, it is now generally accepted that the primary seat of the disease is in the thyroid, and that the nervous phenomena are produced by the perverted activity of this organ. This theory has been well demonstrated by experimentation, as an identical symptom complex can be produced by over-feeding with thyroid substance. Edmunds found that feeding with large quantities of thyroid produced hyperemia and finally hemorrhage of the suprarenals and prolonged thyroid poisoning caused emaciation, muscular weakness, mydriasis, loss of hair and general debility.

No satisfactory cause has ever been assigned for goitre. Drinking water, especially that containing calcium and magnesium salts, has been blamed, and climatic conditions seem also to have some effect, though no locality of the world is free from it, nor any race of people. In some places it is endemic, as in certain portions of Switzerland, and it seems to have a prevalence for mountainous regions and high plateaus and for the valleys between these mountains. In certain of these districts where it is endemic all of the inhabitants seem to be goitrous, and the offspring of these people are apparently born with goitre. Removal from these goitrous districts sometimes produces a cure, and strangers taking up their habitation in these goitrous districts frequently develop the disease. On the American continent it is most frequently seen in Michigan and certain portions of Canada. Certain tribes of Indians, especially the Crows, Menominees, Cheyennes, are subject to it.

The appearance of patients suffering from exophthalmic goitre is very typical. The eyes are bulging; the thyroid is not as a rule enormously enlarged. The patient is usually thin, emaciated, the skin is thick, pigmented and frequently scaly; the hair is coarse, but usually sparse. Tachycardia is a troublesome symptom; vasomotor disturbances are conspicuous, including rise of temperature; the digestive tract is disturbed; anorexia, vomiting, and diarrhea are the rule. Disturbances of the genital tract in both male and female are usually present; either amenorrhea, dysmenorrhea or menorrhagia in the female and impotency in the male. Severe nervous symptoms, particularly insomnia and tremors, rapid loss of weight, glycosuria, general depression, profuse sweating, mental confusion with hallucinations, spasms and epilepti-form attacks with articular and muscular pains complete the symptom complex of this disease.

It is a struma in which there is enlargement of the whole or part of the thyroid gland. It may be benign or malignant, but it is usually benign. Where the parenchymatous tissue is mainly involved there is an increase of colloid substance which may be poured into the circulation or stored up in the gland itself. It may be interstitial or fibrous, or may be vascular, in which case there are large sinuses developed in the gland. It may be either acute or chronic. In acute cases, sometimes within a few days or even within a few hours, marked increase of size of the thyroid develops, which is accompanied by dyspnea, or even cyanosis, tachycardia, rapid pulse and nervous excitement. These acute cases mostly occur in women, and are very rarely seen in men. They often disappear spontaneously without treatment. When dyspnea is present it is due to pressure on the trachia, and is not necessarily influenced by the size of the goitre, but rather by the pressure exerted by muscles, etc., from without. Dyspnea may also be very much influenced by the position of the goitre. When the isthmus, for instance, is involved, the dyspnea is always greater. These acute cases of goitre frequently occur during menstrual periods, again calling attention to the relation between the thyroid gland and organs of generation. Chronic goitre may attain very large size without producing any considerable disturbance in breathing, or in fact, of any kind, except the sense of weight which depends upon the size of the tumor. Pressure of the recurrent laryngeal nerve or upon the phrenic, or upon the sympathetic may cause special symptoms. The pressure on the larynx and the recurrent laryngeal nerve alters the voice. Patients suffering from chronic goitre are nervous and irritable, and often eventually develop myxedematous symptoms due to fibrous changes and consequent insufficiency of its secretion. These patients are heavy, dull and apathetic.

Treatment.

Treatment may be medical or surgical. Iodine is the principal drug used in the treatment of this disease.

Medicinal treatment is most effective in recent cases and in chlorotic girls. In exophthalmic goitre, and in vascular goitre especially, electricity is of considerable effect. The sinusoidal current when applied to the seventh cervical vertebra, as advised by Abrams, produces very wonderful and immediate effects. The author has seen small vascular goitres flatten out and disappear almost instantly under this procedure, and the exophthalmus is diminished to a similar degree.

Some extremely interesting experiments have been performed in the way of organotherapy in relation to this disease by Mobius, Lanz, Burghart, Ballat, Enrique, and others. The two latter obtained the serum from thyroidectomized dogs and injected it into patients suffering from goitre with very splendid temporary results. Mobius obtained a serum from sheep whose thyroid had been removed six weeks previously. Lanz used the milk from goats who had been thyroidectomized. Burghhart and Blumenthall introduced a substance obtained from the serum of thyroidectomized sheep which was called thyroidectin. These experiments, however, are so recent that we are unable to ascertain how much permanency will result, and in view of the fact that there is a polyglandular dystrophy in this disease, as in all other conditions in which this vital chain is disturbed, it scarcely seems feasible to use these single products alone.

Rest is the most important remedial agent for the asthenia, tachycardia and the nervous depression. The cases, in which there is polyuria and glycosuria, require diabetic diet. Otherwise the treatment is symptomatic.

CHAPTER XV.

CRETINISM AND MYXEDEMA.

The symptom complex of thyroid insufficiency when occurring in infancy and early childhood is called cretinism. It is a congenital atrophy or dystrophy of the thyroid. The same struma in adult life is termed myxedema. Cretinism may develop immediately after birth, or any time before puberty. The gland may be congenitally absent or deficient in development. However, the child may appear perfectly normal up to the sixth month, during which time the thymus is actively functionating and may possibly compensate for the lack of thyroid secretion. The picture of the cretin child is one of the most striking and pathetic that we have in the whole realm of medicine, and the results of treatment are perhaps the most brilliant. The cretin is defective in development both mentally and physically. The fontanells remain open, the hair upon the scalp is thin, dry and brittle, the skin is of a lardy color, the head, as a rule is small and round, with prominent forehead, and the face pudgy and swollen in appearance, which causes the eyes to appear as mere slits. The lips and mouth are large and conspicuous. The tongue is large and protruding, seeming to be too big for the mouth to properly contain. There is usually dribbling of saliva from the mouth. The conformation of the body is pot-bellied; the knees are wabbly and the extremities very much underdeveloped. The teeth are few and widely spaced; they decay early. Walking is delayed. The mentality of the patient is always very much impaired. Idiocy is the rule.

Myxedema.

Myxedema is simply adult cretinism, and as stated above, frequently supervenes upon goitre when it has reached a state in which there is athyrea. In countries and sections where goitre is endemic or very prevalent, myxedema and cretinism are sure to be common. They are sporadic in all parts of the world, and are more frequent in males than in females. It is most frequent between the ages of twenty and forty. The appearance of the body is bulky and swollen looking; the skin is free from wrinkles, looks tightly drawn and edematous, but does not pit upon pressure. It is firm and inelastic. The face is boggy looking and the expression is immobile. The nose is broad and heavy, and the lips, mouth and tongue increased in size. The whole body has a bulky appearance; the muscles are flabby and the movements labored. Asthenia is a prominent symptom; loss of memory is conspicuous. The patients are suspicious and subject to delusions and hallucinations. Dementia is common. The abdominal viscera are edematous; gastro-intestinal symptoms are prominent, and the heart action and circulation feeble. The urinary symptoms are similar to those of Bright's disease.

The auto-protective power which the secretion of the thyroid gives is absent, as indicated by the ease with which infection develops in these patients.

Horseley conducted the first experiments in the way of thyroid treatment of this disease by planting or grafting portions of the thyroid gland into the tissues of the cretinic or myxedematous subject, and the results were striking and continued as long as the graft remained, but as soon as absorption was complete, the effect disappeared. Howitz was the first to introduce the use of the dry gland.

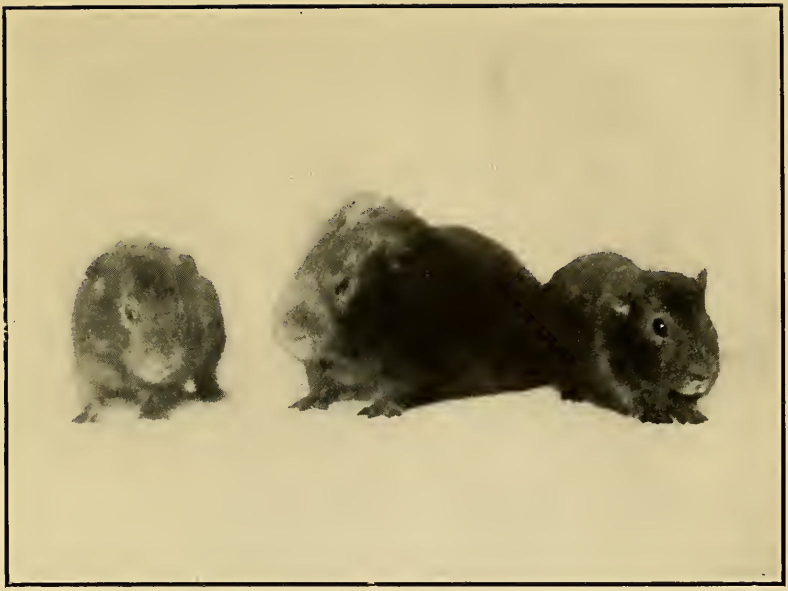
The most brilliant results in treatment have been obtained by the use of thyroid preparations. The patient can be transformed from a pot-bellied, pudgy faced, wabbly kneed, dribbling idiot into a well nourished, mentally competent and healthy looking child in a very few months by the intelligent administration of these organic products, and the effect on myxedema is almost as striking.

CHAPTER XVI.

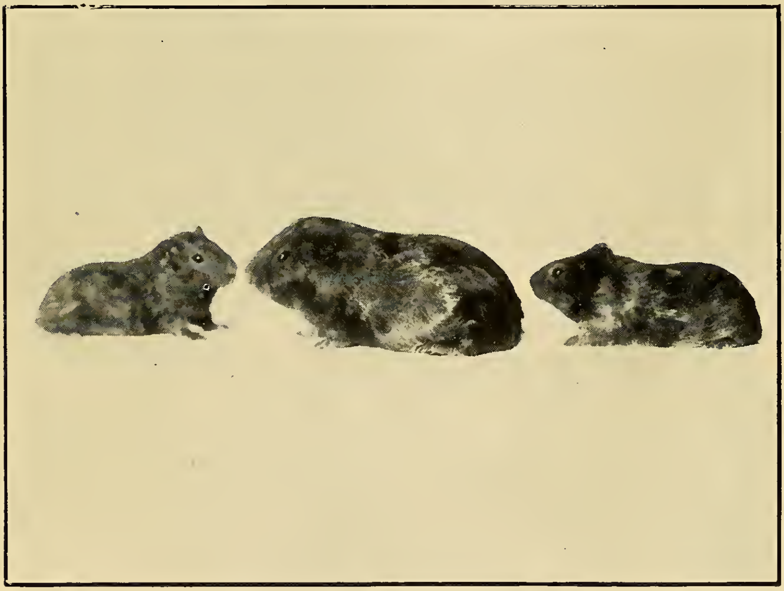
ACROMEGALY.

Acromegaly is a disease or syndrome in which the organs of internal secretion are deranged, but in which the pituitary or hypophysis is most conspicuously involved. Therefore, it is classified as a disease of the pituitary body.

Since Marie first described acromegaly there have been many disputes as to its exact etiology, but all of these disputes have always centered around the pituitary body, although the persistence of the thymus gland has been claimed to be an essential factor as well as an increase of the chromophilic cells. Part of this dispute no doubt has been due to the fact that we have frequently late in acromegaly symptoms of hypopituitaryism superimposed upon hyperpituitaryism. There can no longer be any doubt that hyperpituitaryism is the essential active cause in this condition. Many experiments have been performed with the view of producing acromegaly artificially, and in one case at least the author has succeeded in producing an experimental acromegaly in a guinea pig, which is shown in accompanying illustration. When the pituitary body performs excessive work due to hyperemia or irritation for a considerable length of time, it, like all other organs under similar conditions, even-



Guinea pig in which acromegaly was produced experimentally by the author. Note broad face, large jaw, hump on back and general increase in skeletal growth. Compare with mother and father on either side. Weight 56 ounces. Parents weigh 20 ounces. This pig displayed all mental, nervous and physical phenomena of acromegaly.



Side view of pigs in upper illustration.

tually assumes a condition wherein its function is decreased to a state below the normal. Thus the symptoms of hypopituitaryism are added to those already produced by the increased function or hyperpituitaryism which are permanent in the bony parts.

The similarity between certain of the symptoms present in acromegaly and those of tabes dorsalis have been alluded to in a previous chapter, and the author will again call attention to some of them in this chapter.

Acromegaly is characterized by enlargement of the acral parts, the long bones, especially their spongy structure, producing not only an increase in length but also a marked increase in thickness. The face is enormously enlarged due to an increase of the bony structure of the skull and to hyperplasia of the soft parts as well. The supraorbital region is unusually prominent. The cheek-bones are very conspicuous and the lower jaw especially large and protruding. The nose is elongated and broadened; the lips are thick and protruding; the tongue and tonsils are enlarged, as a rule; the eyes are frequently prominent; the skin is heavy, deeply lined and boggy, with large pores; the hair is coarse and thick in the beginning, though later it may be scarce, and when the symptoms of hypopituitaryism are superimposed, the skin becomes less coarse and edematous, and the lips less prominent. The teeth are frequently unable to meet because of the protrusion of the under jaw; the larynx is increased in size causing it to become prominent, and the voice becomes deeper in tone in both sexes.

The thyroid gland may be enlarged, or degenerated changes of an atrophic order may take place in it. The hands and feet are greatly increased in size, both in length and thickness. One of the early signs of acromegaly, due to the increased size of the parts, is the necessity of obtaining larger sized gloves and shoes, or the inability to longer wear a ring which has habitually been worn on a certain finger.

The sexual organs may be either hypertrophic or atrophic. Atrophy of the ovaries and uterus is frequent when the disease affects the female. The heart, liver and spleen are frequently enlarged. The spine is kyphotic in the cervical and upper dorsal regions, and there is frequently lordosis in the lower lumbar section giving a peculiar attitude to the patient upon standing, which is also a frequent characteristic of tabes. Clavicles, sternum, ribs, pelvis and patella are all increased in size. Pigmentation of the skin is often noticeable, which would indicate involvement of the suprarenal glands. There may be muscular atrophy or degeneration.

Like in tabes, the tendon reflexes are diminished or absent. They are never increased. Glycosuria, polyuria, polydipsia, and polyphagia are frequent symptoms. Increased sweating is also usually conspicuous. Persistent splitting headaches and epistaxis are troublesome accompaniments of this disease, as is paresis of the third nerve, causing an external squint. Temporal hemianopsia, optic neuro-retinitis or optic atrophy are frequent ocular manifestations, and all of these eye conditions are common in tabes. Again, as in tabes, the memory is impaired, and during the earlier stages the patient is excitable, irritable, verbose, very positive in his opinions, and inclined to hold himself in high esteem, and later when the hypopituitaryism intervenes, he becomes placid and docile, conservative in his mental activities and deliberate in his movements. The acral paresthesia and pains in the extremities, apathy, mental dullness, sexual impotency in the male and amenorrhea in the female again remind us of locomotor ataxia.

In the later stages, where there is hypopituitaryism especially, there is a distinct decrease in temperature, the temperature ranging from 97 to 97.5, and the patient complains of chilliness of hands and feet, which are cold and clammy.

The disease may last from five to fifty years, and usually terminates in diabetic coma. At autopsy the usual findings are pituitary overgrowth with pressure on the neighboring structures, and many of the post-mortem findings are dependent upon the degree and character of this pressure. The optic commisure and other structures frequently show atrophic changes, and the sella-turcica is greatly enlarged as a rule, and there is a general skeletal thickening.

CHAPTER XVII.

Addison's Disease.

When in 1855 Dr. Thomas Addison of Guy's Hospital, London, published his work on the constitutional and local effects of suprarenal disease, he met with the usual opposition from his colleagues which all leaders and epoch makers in the medical ranks have received. Sir Samuel Wilks, however, through his persistent efforts and manly moral support finally obtained for him the recognition which he deserved. This symptom complex, or disease, however, was first called Addison's disease by Dr. Trausseau many years later, and Dr. Headlam Greenhaw in his Crooniam lecture in 1875 gave Addison full acknowledgment. Shafer and Oliver, also of London, demonstrated the fact that the suprarenal gland produces an internal secretion of great importance to normal metabolism. There has been much dispute as to the cause of Addison's disease. The presence of tuberculosis is frequently met with in this disease, and is usually present in both glands, and in these cases there are usually signs of tuberculosis present either in the lungs, lymphatic glands or the bones. It has, however, been proved to be due to absence of, diminution, or perversion of the adrenal secretion. Irritation or disease of the sympathetic nervous system, especially of the solar plexus, has been supposed to be the underlying cause. Although the suprarenal is undoubtedly primarily involved, the symptom complex is in all probability caused by glandular inadequacy and sympathetic nerve disturbance. More than 80 per cent. of all patients who develop this disease have tuberculosis in some form, most frequently of the spine. At autopsy it has been shown, however, that in a number of cases there are no essential changes in the suprarenal gland, neither tuberculosis or hypertrophy, atrophy, or any other condition, which would indicate that a simple dystrophy of this gland with its perverted secretion can be responsible for the disease. On the other hand, the findings may run all the way from a simple sclerosis to carcinoma or sarcoma. In some of the cases at autopsy where the glands appear normal, the solar plexus of the sympathetic was imbedded in a mass of fibrous tissue. It attacks most frequently persons of the poorer classes who are underfed and live in unhygienic surroundings and are, therefore, predisposed to tuberculosis. It is also a common complication of myxedema and goitre, showing the polyglandular nature of the disease. It is more prevalent in males than in females.

The most prominent symptoms of Addison's disease are a progressive increase in the normal pigmentation of the skin. This causes gradations of color ranging from pale, yellow, green and bronze to black. It is more or less selective in its arrangement. The exposed parts as the face and hands, and those parts which are normally most pigmented, such as the axilla areolae around the nipples, and where pressure is exerted by the clothing, etc., are first darkened. The mucus membranes may also be darkened. It is insidious in its onset. Increasing asthenia develops, which is both mental and physical. The heart is irregular and feeble in its action. Syncope or fainting is frequent and may be so severe as to even prove fatal. The blood pressure is very low and the temperature subnormal. The gastro-intestinal tract is attacked, anorexia, nausea, vomiting and diarrhea develop. The spleen, intestines, heart, liver and kidneys are subject to degenerative changes.

Treatment consists of rest, fresh air, concentrated nutrition, and hygienic precautions, such as would be advised in tuberculosis, plus special treatment for the symptoms and extract, of the suprarenal gland, for the circulatory depression.

CHAPTER XVIII.

SENILITY.

The wish in man is native to remain
  Long with the living, for to live is sweet.
His wish he may by abstinence attain.
  Dame Reason counsels, sober and discreet,
This way that solid privilege to gain,
  And tardy to the realm of shades retreat.
—*Gualdo.*

So far back as we have any history of human activities, the one great prize that has been sought by man has been a means of prolonging life and postponing senility. In the days of Alchemy an elixir of life was urgently and persistently sought; an elixir vitate, a sublime substance, a potent, perfect and priceless fluid which, if discovered, would confer immortality, or at least extreme length of life, upon him who drank it. Ponce de Leon made his famous voyage and adventurous march through the forests of the new world inspired by the same hope; only his martial and romantic spirit sought its realization not in the retorts and crucibles of the cloistered alchemist, but somewhere in the wonderland of America; not in some scantily distilled essence, but in a gushing, exhaustless fountain, under the open sky; a fountain whose sparkling waters would endow him who drank and bathed, with the gift of eternal youth; the ultimate, supreme reward of the discoverer and the warrior, before whom the new world opened a vista, in which everything was possible. While the adventurer and the alchemist cherished hopes of some wondrous discovery, those whose minds were of a different type, built their fanciful structures not in the future, but in the past; in the era of myth and fable when gods and men mingled together and all the forces of nature were personified; hence the folklore of many countries has tales of men exempted from the power of death, of women perennially young and fair. There are quaint and charming legends of this sort in the mythology of Ireland and also in the Scandinavian sagas, which were committed to writing, at a very early date and show the childish credulity of a primitive stage of civilization. Such is the myth of the goddess Iduna, who kept a basket of beautiful, ripe apples. Whenever any of the divinities observed in themselves signs of old age, resort was had to this fruit and a bite of it banished the dreaded precursors of decay. It once happened that the apple basket was stolen from Asgard, the abode of the gods, and hidden in a cave upon a mountain side. Then consternation seized the divinities; for wrinkles and gray hairs began to harass them just as they do short lived human beings. At last, by the use of magic, the fruit was restored and then youth and joy were again supreme in Asgard.

The classic myth of Medea reflects the quality of the Greek mind in the feature that the narrative while improbable is not absurd; but might be true under certain conceivable conditions. She was the daughter of the king of Colchis and when the hero, Jason, came thither in quest of the golden fleece she fell in love with him, helped to secure the fleece and then fled with the Greek upon his ship Argo, which after a most adventurous voyage returned to the city of Argos. Here resided Jason's father, Aeson, who was an aged man. Anxious to please Jason, Medea offered to employ her skill in magic for the fathers' benefit. She did not offer to confer upon him immortality; but promised to restore his youthful vigor by withdrawing the blood from his veins and infusing as a substitute a magical liquid, whose composition she did not disclose. As the transfusion proceeded, Aeson gradually regained the appearance and strength of a youth and Medea became the most famous enchantress in Greece. It is easy to trace in this myth the influence of the humoral pathology, which was a doctrine of the most ancient physicians. They believed that the causes of disease and decay inhered in the blood and other fluids (humors) of the body, so that if degenerated humors could be replaced by those of a perfectly healthy kind, the solid organs would recover their normal activities and there would ensue at least a partial rejuvenation. In this theory there is certainly a grain of truth, perhaps more than one.

The human desire for continuance of life, the regret for the loss of youth and dreams of its restoration, are themes not only of the varied mythologies, but fiction is replete with mystical treatment of the same ideas. Bulwer Lytton's Zanoni and Goethe's Faust are notable examples of their artistic development by great novelists and the famous legend of Ahasuerus, the Wandering Jew, which was once universally credited and is still believed by many people, particularly in Russia, has a cognate origin, although the Jew was endowed with an earthly immortality not as a blessing, but a curse; and he is pictured as constantly seeking death, which as constantly eludes him, while he can never banish from thought the words of his doom: "Alas! wretched man, thou shalt go on and on, until the end of the world."

But in real life, although many theories and methods have been evolved, nothing like perpetual existence has or ever will be achieved, and no such sudden metamorphosis, as Faust underwent, can be accomplished. And yet there is no reason to believe that the life of protoplasm has a limited duration, provided that the conditions proper to it are maintained. It has been argued that as every living organism comes into existence as a piece of the protoplasm of a pre-existing living organism, protoplasm is potentially immortal. Thought and knowledge, transmitted from age to age, are immortal, as far as we can judge.

To stay the hand of time and prevent his tracings upon face and form is the great perplexing problem which consumes the lady of fashion and the gallant, and many are the methods and devices used to cover these markings when they do appear. To postpone the approach of old age and lengthen the productive period of the individual is an economic problem of paramount importance. The wage earner looks forward with dread to the time when his earning power will be curtailed. This is the age of the young. It is difficult for persons of advanced years to earn a livelihood, and the tendency is to crowd out the old and replace them by younger blood. Efficiency is the great requirement of our modern business methods, and this very often means the rapid performance of some one, small, monotonous task. It is difficult for a man past 35 or 40 years to secure employment in a new vocation.

While these things are so, thoughtful men recognize that there are facts upon the other side of the balance which are already showing their influence and will weigh more heavily in the near future. One of these facts is that the discrimination in favor of young workers has gone further than is reasonable. In such a case, a reaction is pretty sure to come, as sociologic experience abundantly proves. Young men and women can do well certain kinds of work; but for other kinds maturity is far better suited. The educational success of Germany is mainly due to the thorough instruction given in the primary and secondary schools. The students coming from them to the technical institutes and universities have a preparation in languages, mathematics and other branches which is far superior to that given in most countries, and the fine teaching in these German schools is mainly done by middle-aged men, who continue in the service until sixty-five or seventy years of age. Much attention has recently been directed to this fact and already the average age of the faculty in several of our universities has risen above what it was ten years ago.

Much of the world's greatest work has been produced and is now being produced by men who have passed Dr. Osler's age to be chloroformed. Sir William is himself far beyond it; but there is no sign of his seeking euthanasia. Goethe completed the second part of Faust after he was eighty years old. At a similar age William E. Gladstone directed the policy of the British Empire and William Cullen Bryant composed some of his best poetry. Victor Hugo and Ibsen did much of their brilliant literary work when of advanced age. Rodin's creative power is as potent at nearly eighty as it was in his youth. There is, however, much evidence that these well-preserved men had glands of internal secretion fully developed and performing their normal functions.

Even in warfare, where physical buoyance, mental alertness and the youthful love of fighting, all conspire to give pre-eminence to young men, a most notable instance of superiority in the old and experienced is furnished by the history of the famous Franco-Prussian war in 1870. In that contest, the French, whose bravery and patriotism are beyond question, suffered a disastrous and humiliating defeat and it was inflicted by an army officered by old men. Most of the German commanders were far past the zenith of their physical vigor. The Emperor William was 73, Field Marshal Von Moltke, 70; Van Roon, 67, and Mannteuffel, 65. Prince Bismarck, the youngest of the group, was 57 and was in broken health. The defeated French generals were nearly all much younger men.

It is also true that the present-day prominence of young men, in many industries, is due to the fact that the industries, *e. g.*, electric lighting, trolley transportation, telephoning, are themselves quite recent and very naturally places in new industries are filled by new and youthful men, because older men of ability are already profitably and permanently employed. A score of years from now the trolley lines, telephone systems and lighting plants will still be managed chiefly by the men who developed them and who are now in control. Then the average age of these captains of modern industries will be very much greater and on a par with that of the officers of banks and trust companies, where graybeards constitute the majority.

The single cell is the ultimate habitation of life, but unicellular organisms have the shortest duration of life, and as the organism becomes more complex and complicated through the different stages of evolution, the longer is the period of life. The single cell is unable to eliminate waste, which rapidly accumulates and ends its existence. Some very interesting experiments along this line have been conducted by Dr. Alexis Carrell, who succeeded in growing tissue (in vitro) by the assistance of certain derivatives of the glands of internal secretion. He could produce cell proliferation and growth up to a certain point when it would cease and death occur, unless the cells were taken out of the medium in which they were grown, and washed, thus providing elimination, and then replanted in the medium. Freezing, or lowering of temperature to a considerable degree below that at which the growth occurred, was resorted to in order to give the cells rest, which is a prime necessity of life. By this method of procedure, repeated several times, the growth could be continued for a considerable length of time, showing that the cell in itself has not the power of proper elimination, but must be assisted. Oxidation is an underlying principle of elimination and a fundamental necessity of life.

Many have sought to arrive at a definite measurement of the natural length of life. G. L. L. Buffon believed that the whole period of expectancy of life could be ascertained by multiplying the period of growth by six or seven. Thus taking the period at which puberty is reached as fourteen years, the duration of life would be from ninety to a hundred years.

According to Flourens's theory, the period of time required for the epiphyseal cartilage to become ossified, if multiplied by five would give the rational expectancy of the life of the individual.

Weissman's theory was that the length of life of the human, as of many other organisms, depends upon the time required for reproduction, meaning not merely the period necessary to attain the age at which conception can occur, plus the period of gestation, but adding to this the time required for the rearing and protecting of the young until a self-sustaining age has been reached.

According to Metchnikoff, the length of life decreases as the scale ascends. He claims that this is governed by the development of the hind gut or large intestine, and colon. Fishes and reptiles in which the intestinal development is very incomplete have the longest lease of life. Birds whose intestinal development comes next are also, according to this author, next in period of longevity. According to this theory the hind gut or large intestine, which is of extensive length in mammals and particularly in men, is not important to digestion, but is the receptacle for storage of waste and the site at which much putrefaction and absorption of poisonous products take place. These products of auto-intoxication he believes to be the principal agents in the production of senile decay. He believes that these toxic substances when absorbed into the blood stimulate phagocytic action, which impoverishes cellular life and shortens the somatic existence. This theory, however, has never been distinctly proved, although it is in harmony with our general knowledge of the glands of internal secretion.

Many other such theories have been evolved, but none of them have stood the test of time. The length of life depends materially upon many things, the principal among which are heredity, natural vitality, mode of life, state of civilization in which the person lives, habits, conjugal relations, habitation, social position, etc. The fact that heredity has a marked influence on longevity is unquestioned. Statistics are replete with instances of many members of certain families attaining very great age. Many of the tales, however of advanced age that are instanced by writers upon this subject must be taken with considerable incredence. Thomas Parr, a Shropshire peasant, for instance, who died in 1635 at an age which was claimed to have been 153 years, and who was examined post-mortem by the renowned Harvey, the discoverer of the circulation, it is said was found to be in perfect physical condition, and had not his king induced him to forsake the frugal existence to which he had been accustomed, he probably would have lived for many additional years.

Petraz Czarton was said to have died in Russia in 1721 at the age of 185 years and had a son 95 years. Convincing proof of this, however, is lacking.

It is claimed that in 1797 in Bergen, Joseph Sarrington died at an age said to have been 160 years. His oldest child was 103 and youngest 9 years of age.

These instances are cited with the view of establishing the potency of the sexual glands and by deduction the competency of the remaining glands of internal secretions in these extremely old individuals. If a man, for instance, at the age of 160 could be the father of a child of nine years, it must certainly show a wonderful state of preservation of his glands of internal secretion.

Persons of short lived families can materially increase their span of existence by leading a simple and hygienic life. On the other hand, there are many conspicuous examples of persons whose natural vitality, in spite of detrimental habits, carried them through life to a very healthy extreme old age.

Tiberius, who was noted for his profligacy, died at the age of 78. Goethe, who was one of the old roués of his time and whose mind undoubtedly dwelt to a very great extent upon matters sexual, lived to an advanced age and was able to do some of his great work at that time. Persons leading a simple and tranquil existence, those who live largely in the open air and are occupied both in mind and body during a considerable part of the time, and who partake of simple food, retiring and rising early, are apt to reach an advanced age. Notwithstanding the contrary opinion that has become prevalent, civilization is conducive to long life. It is indisputable that our modern hygienic methods and our present knowledge of the prevention and treatment of disease, especially among young children, is conducive to longevity. The comforts and freedom from hardships of our modern civilization have a decided tendency to prolong life.

The advantages or disadvantages of social position have a very distinct influence upon longevity. The individual with sufficient means to provide the necessaries and comforts of life, to procure sufficient nourishment and rest; who is free from the hardships of drudgery and the inclemencies of the weather, and whose mind is free from the anxieties and worriment incident to poverty, is in a position to anticipate long life; while, on the other hand, those of the poorer classes who live in unhygienic surroundings, are descended from persons of the same class, subject to the pangs of hunger, and at the same time deprived of proper rest and fresh air by being overworked in childhood and through life, are prone to the infections of disease, and their organs of internal secretion are robbed of their natural vitality. Their expectation of longevity is, therefore, proportionately lessened.

The habitation in which we live is also an important factor. The temperate zone gives better environment for long life than localities where great extremes of temperature occur. The customs and modes of living of different countries also have a marked influence in this respect. Bulgaria, with its seven million people, has 2,800 persons more than one hundred years of age. This can be attributed to a very great extent to the simple life which its people lead. They are in the open air most of the time and their food is extremely simple, consisting largely of soured or curdled milk rich in lactic acid bacilli. At the other extreme comes Germany, with its sixty-one million inhabitants and only seventy-one centenarians. Notwithstanding the very advanced civilization of Germany, this state can be largely attributed to their dietary habits; they are noted for their tendency to consume immense quantities of salted and smoked meats, sausages, etc., the harmful effects of which upon digestion have been pointed out by the author elsewhere, and foods rich in cellulose, which have a decided tendency toward fermentation and putrefaction. Their beer drinking propensity is also an important factor in lessening their longevity, and their usefulness, as their Emperor has recently recognized. As shown by the statistics of insurance actuaries, the married state undoubtedly tends to prolong life. Most of the persons who are cited as conspicuous instances of great longevity married early, and several of them, after having lost their partners, married younger mates late in life. To this association with young wives a tendency to prolong life has been attributed by many authors.

One of the most conspicuous conditions that favors early senility and shortens life is again heredity. Descendants of parents with tubercular or syphilitic disease, or whose bodies or minds were weak from any other cause; or those addicted to alcoholism or drug habits; or who were affected by acromegaly, cretinism and myxedema, are hampered in their struggle for long life. Infectious diseases, measles, scarlet fever, mumps, typhoid fever, malaria, and the different cachexias, also have a distinct influence in shortening life, due largely to the effect of these diseases upon the ductless glands. In all of them these glands are attacked and their vitality lessened. In mumps the testes or ovaries are particularly liable to involvement, which frequently leaves a sclerosed useless organ and robs the individual of that much of the vital internal secretion.

Lack of natural vitality is also an important factor in the production of early senility. Many weak, puny children seem old from birth and never develop into ruddy childhood or youth, and at an early age develop the signs of senile decay.

Mode of life must be considered in this connection. Those who are subject to debauchery or excesses of any kind, who imbibe alcohol or drugs, who indulge largely in coffee, tea and tobacco, or are subject to gluttony, or are slovenly and unhygienic in their habits, shorten their natural expectancy of life. The poor, who are underfed and overworked, have not the chance of long life that their more fortunate brothers have. The idler who employs neither body nor mind, as a rule, dies an early death of imbecility and dry rot, because he does not exert himself sufficiently to promote oxidation and elimination of waste products. Of all sins, idleness is perhaps the worst. Celibacy, as followed by those not in the married state, is conducive to short life. It is productive of suppression of natural instincts, and there seems to be a requirement upon the part of nature for the close association of the two sexes. Too frequent pregnancies and child-bearing with prolonged lactation have a tendency to shorten life and bring on early signs of senility. Habitation in countries where the individual is exposed to extremes of weather also tends to shorten life.

No definite rules can be laid down to prolong the span of life that will fit all individuals, and, in fact, there are many instances on record where, in spite of the transgression of all laws of morality and hygiene, men have lived to extraordinary age, apparently solely on account of their own inherent vitality. It would seem, however, that after heredity, the most essential element conducive to long life is the possession of a healthy mind in a sound body, and especially healthy organs of internal secretion.

Owing to the peculiar distribution of the organs of internal secretion, it is difficult to ascertain the exact state of any of them excepting the sexual glands, and these, of course, are best examined in the male. With our present knowledge of the intimate relation of these glands one with the other and the influence of diseases, degeneration or malformation of one upon the others, we can reasonably conclude that persons with well developed and potent sexual glands have vigorous adrenals, thyroids, and pituitaries.

Symptoms of old age may be found in persons still in early life whose glands of internal secretion are diseased or impaired. In persons giving a history of infectious disease, mental shocks, grief, worry, alcoholic or sexual excess, improper habits of eating or hygiene, or bad family history, the antibodies which are produced normally by the glands of internal secretion are deficient or wanting.

Pituitary derangement is manifested by acromegaly, thickening of the lips and nose, prominence of the occipital bone, the cheek-bones and a large jaw. Also by headache, neurasthenia, epistaxis and hemianopsia. There is a tendency to obesity, loss of memory, lessened mental acuity, lowered temperature, lowered blood pressure, sluggishness in thought, speech and movements. Tranquillity and geniality of temperament are easily recognized.

Thyroid insufficiency is indicated by thin, dry hair, pale, yellow skin with red spots on cheeks, lack of perspiration, wrinkled forehead and puffiness of tissues about the eyes; wrinkled skin of hands and undeveloped sexual glands. A deficiency of the internal secretion of the sexual glands produces flabby muscles, lacking firmness and elasticity. Varicose veins are frequent, and are the source of nervous and mental symptoms. The flabbiness of the musculature is apt to produce visceroptosis, due to lack of support of the internal organs.

Examination of the heart in these conditions shows lack of tone of the myocardium. The second aortic sound is exaggerated in cases where arterio-sclerosis is a prominent symptom and the myocardial involvement is not great. Later, when the heart muscle becomes flabby, the second aortic sound is weakened. The pulse in the beginning is hard and incompressible, later soft and flabby. It must be remembered, however, that a soft pulse may be present where there is high blood pressure and arterio-sclerosis.

Examination of the liver frequently shows sclerosis, or still more frequently gall-bladder involvement. There is a distinct relation between the thyroid gland and the gall-bladder. Persons of advanced years, especially females with thyroid involvement, are particularly prone to gallstones and catarrh of the gall-bladder and its ducts. This is a very frequent accompaniment of the climacteric. Flatulency, with other disorders of the gastro-intestinal tract, are signs of ovarian involvement. Headache, especially occipital, migraine, neuralgia and mental symptoms usually develop due to deficient oxidation and elimination. Mental dullness, loss of memory, especially of recent events, apathy, disinclination to move, and a tendency to sit in the same position indefinitely, disturbing dreams, in which the appearance of small animals is very frequent, as pointed out by Murray, are indications of thyroid insufficiency.

The intestines show atony. The tonicity of the muscular coat of the intestines is influenced in the same way by the internal secretions as the muscles of the body in general. This atony of the intestines favors constipation and retards peristalsis, and hence is conducive to gall-bladder infection and gall-stone formation.

The relation of the splanchnic sympathetic nervous plexus to the glands of internal secretion has been pointed out above, and it is an important factor in the production of these gastro-intestinal and hepatic symptoms.

The kidneys frequently show interstitial nephritis, or gravel with renal colic. The specific gravity of the urine is low and it is pale in color and deficient in solids, showing a lack of proper oxidation and elimination of toxic products of metabolism.

The close relation between the kidneys and the ductless glands is shown by the fact that extirpation of the thyroid produces sclerosis of the kidneys. Nephritis is a constant accompaniment of myxedema and cretinism.

Treatment.

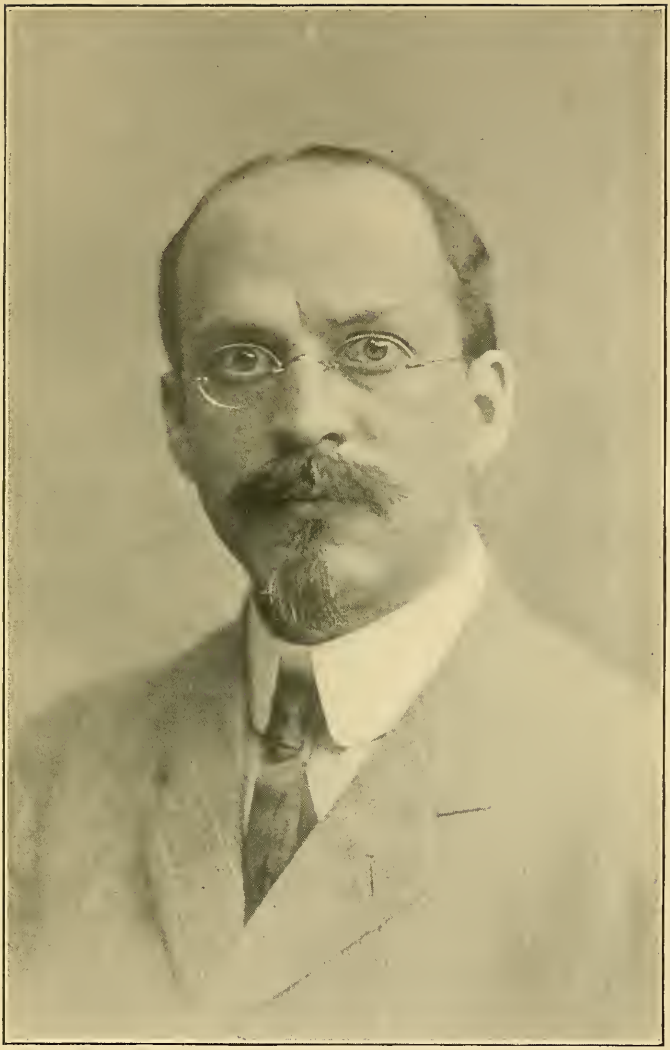
The treatment of senility may be divided into prophylaxis, diet, hygiene and organotherapy. Early senility can be prevented to a very considerable extent, as indicated above, by proper mode of living, abstinence from excesses of all kinds, in eating, drinking, working and playing. Overindulgence in meats, by favoring intestinal putrefaction and a consequent absorption of toxic substances, is productive of degeneration of the glands of internal secretion. Indulgence in alcohol, tea, coffee, condiments and tobacco, and excesses of all kinds have a similar tendency. The rationality of an abstemious life was beautifully exemplified in the case of Louis Carnaro, who, although originally a profligate, by finally resorting to an abstemious life, was able to regain his health and lived to be more than one hundred years of age. The rejuvenescent influence of the products of the ductless glands, when administered after senility has been established, is shown in a few case histories here appended and some striking examples, particularly of the author's own experience and that of one of his patients, illustrated by photographs reproduced.

Senility.

Case No. 1 (70 cases treated). Female, aged 85 years. Very feeble, pale and thin, with slow and dull cerebration. Received injections daily for five days, then weekly for six months. There was marked improvement in her mental condition, with decided gain in strength and a sense of well-being.

Case No. 2. Male, aged 70 years. There was anorexia, constipation, asthenia, tremors and inability to go about alone. Received injections twice weekly for one month; then weekly for six months and they were followed by very great improvement in his mental and physical condition.

Case No. 3. August 28, 1912. Age 76, occupation lawyer; married 45 years; three children. Family history negative. Previous history: Always of delicate health; had nervous prostration twenty-five years ago, and has been more or less nervous ever since. For the last ten years has been neurasthenic; has vertigo, cardiac palpitation upon slight exertion; has never had any serious disease. Easily depressed and has spells of anxiety. Impotency for twenty-five years. Examination: Thin, rather poorly developed man with prominent veins; sallow and sunken cheeks, small bones; rather fine and delicate frame and evidence of arterio-sclerosis. Blood pressure 100 m.m. Physical examination negative. Treatment: Injections 15 m. of polyglandular solution daily for one week, then three times weekly for four months. Noticed distinct increase in strength and sense of buoyancy and well-being after the first three injections. Sexual power shows signs of awakening and power of endurance much increased.



Photograph of author taken in 1910. Note careworn and aged appearance of face.

CHAPTER XIX.

INFLUENCE OF INTERNAL SECRETION ON MENTAL PROCESSES.

In the explanation of many mental conditions we are assisted very little by a study of the anatomy of the brain, but as our researches with the glands of internal secretion proceed, we are able to explain quite a large number of psychoses and deviations from the normal mentality, by the influence that the internal secretions have upon the development, growth and stability of the brain and mind. The relation between the glands of internal secretion and mental conditions is twofold. It may be either the cause or effect.

In considering the influence of the internal secretion on mental processes it is again necessary to consider two groups of symptom complexes, depending upon diametrically opposite states of function of the glands, namely, hypersecretion or overactivity and hyposecretion or deficiency, and we may add to this a third condition in which there is a perversion of the function or a chemical change in the secretion itself. In animals we can produce mental and temperamental changes either by administering products of these glands in excess or by extirpation of these important organs, causing symptoms of hyperactivity or hypoactivity respectively.

We must also bear in mind, in considering this phase of the subject, that while in certain cases an individual gland, as the pituitary, thyroid, adrenal or sexual, may be most conspicuously involved, the condition is invariably polyglandular.

We will commence by studying the psychoses and mental peculiarities that are most intimately related to the organs of generation, because these are best known to most physicians, and indeed are generally recognized by the laity. And for the reason that these mental phenomena are perhaps more conspicuous in females than in males, we will consider the subject in relation to females first.

Before the age of puberty there is very little difference in the secondary sexual development between the two sexes, but as early as the second year distinct mental differences are apparent between the two sexes. The little girl is usually mild and gentle at play, and her games are of a kind peculiar to her sex and free from boisterousness. She wishes to play housekeeper or mother, or school teacher, while the boy wishes to be a soldier, a race-horse driver or Indian fighter, or some such valiant person. At the age when puberty is about to develop girls become restless, less inclined to romp, are nervous and apprehensive; or, on the other hand, may be sleepy and dreamy, developing poetical tendencies. They are frequently melancholic. Their equilibrium of metabolism and mentality are both distinctly disturbed. Girls become bashful, frequently morose and temperamentally changed. On the other hand, a marked increase in mental development may take place, and the girl assumes a mental poise which is far in advance of what it was a short time before. This is most apt to occur, however, after the storm incident to the establishment of puberty has somewhat subsided and is usual between 18 and 22, when the imagination, the power of concentration and mental creation are very much increased. During the menstrual period there is usually either excitement or depression. Most of the crime that is committed by women is done during these periods. There is much evidence in the way of statistics to bear out this statement, and according to Lombroso and others, suicide and insanity are especially frequent during the menstrual period, pregnancy, and the puerperium. Of course, in strong women these nervous phenomena are reduced to a minimum, but in females who are naturally neuropathic their symptoms are always worse at this time. The climacteric again is preceded by unrest and nervous excitement, sexual irritability alternating with periods of depression, melancholia and apathy, with tendency to weeping and distinct deterioration in the mentality and general character of the individual. The tendency is to become vacillating, irritable, unreasonable and gossipy. The old hags of fiction and fairy tales are a conspicuous example of this condition.

Concerning castration in young females we know little, as no extensive or reliable data on the subject has been developed, but in older females the influence is very great, though perhaps not so marked as in the male. It at once produces the cessation of menstruation and the phenomena incident to the climacteric soon develop. In mental diseases of females, as a rule, there is evidence of involvement of either the thyroid or the ovaries, or both. The relation between the female sexual glands and psychosis has been long recognized, and is particularly marked in hysteria. Castration for the cure of this condition in females has been resorted to with rather indefinite success.

It has been said that not only the entire nature but the character of women is governed by the ovaries. Virchow said that a woman is a woman because of her ovaries. The influence of internal secretions was first noticed in connection with the sexual glands. All of the femininity, all that goes to make a woman what she is, that which brings out those peculiar indescribable characteristics which we love in her are governed by the ovaries. Both body and mind are under the direct control of the secretion of these organs.

The influence of the sexual glands upon the development and equilibrium of the mentality of the male is scarcely less pronounced. The boy who is approaching puberty becomes restless, irritable, quick tempered, or he becomes dull and heavy and frequently disinclined to mental effort. He is self-conscious, especially in the presence of the opposite sex. He is bashful and diffident, conscious of his hands and feet, is uncomfortable and subject to blushing and profuse perspiration when forced to be in girls' company. He chooses the society of members of his own sex and loathes the games and company of girls. Not infrequently he develops a strong and secret attachment for some female, although he could not be induced to divulge it to her, and he dreams in secret of the deeds of daring which he would do for her sake. He is awkward and morose. His thyroid enlarges and his voice becomes coarse and it undergoes what is called "changing." His general physical appearance is much changed. The pubic and axillary hair and beard make their appearance. He is sentimental and inclined to read poetry and build aircastles. His views on religion reach a critical period, in which there is either a tendency toward unhealthy devotion, or on the contrary rejection of all things religious which had been accepted previously. He inclines toward mysticism; ambition asserts itself and he is apt to become bombastic. He may become sentimental, neurasthenic and suicide is not infrequent at this age because of love affairs. Sexual emotions are strong, cortical excitability is increased, and his mental and intellectual powers are broadened and his power of comprehension and concentration is increased. Later a more steady condition develops and the youth, self-reliant and fixed in his purposes, enters into manhood. Sexual indulgence has a peculiar mental effect. It is apt to produce an apathy or even disgust for a female for whom the strongest attachment was felt before its accomplishment. Many of those who practice celibacy suffer from neurasthenia, melancholia and different forms of dementia. Where the sexual organs are strong there is usually strong character and will-power, increased executive ability, combativeness, courage and magnetism with a power of accomplishing great mental feats. On the other hand, where the sexual organs have been depleted of their strength through disease , pernicious habits or otherwise, there is lack of self-confidence, diffidence, aversion to society, vacillation, cowardice, lack of energy, and inability to concentrate mental powers. Melancholia, neurasthenia and general inefficiency are conspicuous symptoms. The world owes much of its best music, literature and most useful inventions to the activity of the sexual glands, for poets, musicians and inventors have done a great deal of their most brilliant work under the influence of sexual excitement, not necessarily in their youth, but during amorous periods while their sexual glands were still potent.

At the age of 45 to 55, as a rule, the male climacteric sets in, the disturbances of which, while not so marked as they are in the female, are still pronounced enough to be easily recognized. There is irritability, tendency to despondency and melancholia, but this is soon followed by a calm, clear intellectual development which is free from passion and conducive to deliberate mental processes. Teachers, judges, and statesmen do their best work, as a rule, after they have reached this age.

The influence of castration upon the male is pronounced. The eunuch is vain, proud and fond of dress; cunning, secretive and frequently apt at learning, but has no creative or executive mental ability. On the other hand, he is usually fat, indolent, whimsical and closely resembles a hysterical woman.

The influence of the pituitary gland upon mental processes is evidenced especially in acromegaly and infantilism. In acromegaly, during the stage of excessive function, the patient is irritable, nervous, excitable and may be even violent, with a disagreeable temper. He suffers from insomnia, is morose, suspicious and difficult to manage. Is subject to dizziness and headaches. Later, when deficiency of the secretion sets in, the opposite state of affairs takes place. He becomes calm, deliberate and slow in speech and cerebration. He cannot be hurried, has tendency to drowsiness, and usually sleeps much. Convulsions of an epileptic type develop, and a condition bordering on idiocy is not uncommon.

Thyroid hyperactivity is responsible for quite a marked chain of mental symptoms, as noted particularly in exophthalmic goitre. The patient is nervous, irritable, excitable, subject to tremors or convulsions. Hallucinations or even maniacal delirium are not infrequent. The mental disturbances are distinctly active in type. Patient imagines he sees faces or hears voices, and there is a rise in temperature.

Where thyroid deficiency intervenes symptoms of chronic intoxication appear, and there is nervous depression, loss of memory, somnolence and idiocy or imbecility, as evidenced in cretinism or myxedema. There is difficulty in comprehension or concentration, impaired memory, early mental fatigue, and a general mental apathy. The patient is apt to be hypersensitive and imagines that he has been abused by his friends. Dizziness and headache are frequent symptoms. The mental symptoms of myxedema may be greater than the physical symptoms. There are cases of incomplete myxedema in which no changes in the thyroid or of the general physical condition can be recognized, but in which the mental signs are characteristic. It is important to recognize these cases.

Descartes expressed the thought that the pineal gland contained the seat of the soul. While this view is no longer tenable, the fact that the pineal gland is related to certain psychic phenomena is well recognized. Strange as it may seem, tumors associated with destruction of the pineal gland in children are usually responsible for precocious mental development, but this precocity may not be due to the destruction of the pineal tissue, but to an excitement or excessive action due to an increased blood supply of the part, and later, when the real destructive process takes place, the patient loses his brilliancy.

A case which was reported by Gutzeit and others was an example of this kind, and there seemed to be a peculiar fondness for the discussion of ethical and philosophical questions in this patient as early as the fifth year. It may be mentioned that in this patient full puberty was established at this early age. However, Oesterreich, Slawyk and Raymond reported a case in which there was no particular psychic precocity. Pineal tumor may be responsible for hydrocephalus with early mental development, and later mental deterioration and inclination to be visionary, boastful, revengeful, and untruthful. There is a distinct tendency in these cases for the thoughts to dwell upon sexual matters.

The relation of the parathyroids to mental processes has been pointed out by Hochwart of Vienna, who states that in cases of tetany in which the parathyroids are affected, the individuals are excitable, timid, uneasy, quarrelsome, and inclined to outbreaks of temper. Depression may be present, but is not one of the prominent symptoms. In old patients, however, mental lassitude may appear. By experiments on animals the same mental conditions are produced, as reported by Blum, Horsley, Pineales, and others.

The effect of disease of the suprarenal gland has already been pointed out in the chapter on Addison's Disease, but it may be well to mention here that in these cases there is a distinct mental depression; melancholia and complete hopelessness of the mental outlook is the rule. Buoyancy and hopefulness are usual in pulmonary tuberculosis, but where the suprarenals are involved, depression and lack of cheerfulness are conspicuous.

No definite mental phenomena in the human has ever been traced in the thymus gland, but in animals in which the thymus was removed for experimental purposes there seems to be a decided degenerative tendency in their mental powers. Such experiments are reported by Kalosvidt and Basch. They have called this condition an Idiotic Thymoprivia.

The pancreas may possibly be said to have influence upon mental processes, and this is most marked in the peculiar mental attitude shown in pancreatic diabetes. The patient becomes nervous, irritable, frequently despondent and melancholic.

As pointed out above, the spleen has been credited with mental influences from remote times. It is a question, however, how much truth there is in it. That the liver, however, has considerable influence upon mental conditions can scarcely be denied. It is well known that a sluggish liver which is not functionating properly may be responsible for perverse mental states, and a wise man will not attempt to oppose the wishes of the man with a torpid liver.

CHAPTER XX

OBESITY.

In view of our present knowledge of the glands of internal secretion and their relation to oxidation and metabolism in general, we may safely classify obesity as a disease in which absence, deficiency, or perversion of these vital fluids is the underlying cause. Infantilism in which there is pituitary insufficiency or dystrophy is usually accompanied by obesity.

In cretinism and myxedema in which the thyroid is the gland most affected, obesity is a conspicuous feature. At the time of puberty, when the sexual glands are passing through a critical stage in their development, there is an increase in adipose tissue, and again at the climacteric in both sexes when the sexual glands are again the seat of profound changes, an increase in body fat is the rule. Castration is followed by obesity of a similar character. There is carbohydrate retention and abnormal storing of energy. The auto-protective power is also decreased, as indicated by the low resistance of these patients to infectious diseases. The fact that obesity is so markedly influenced by administration of thyroid products may be considered as a therapeutic test.

The characteristic picture of obesity is so familiar as to need very little description. The head is round, the face is broad with double or triple chin, and maybe either flushed as in the plethoric cases, or pale and lardy as in the anemic ones. The eyes appear small, because of the increase in fat in the surrounding tissue. The neck is thick, which gives it a shortened appearance; the chest is broad and deep. The abdomen is prominent and may even be overhanging. The limbs are cylindrical in conformation and relatively shortened. The flesh frequently hangs in deep folds. The hands and feet are thick and pudgy, and the general appearance is apt to excite disgust. These people are noted for their geniality and have the reputation of being liberal, but they are usually indolent, selfish, exacting, and inclined to be boastful and verbose.

Among the predisposing causes heredity undoubtedly comes first. Many families have a marked tendency to obesity. Climate has a decided influence. In the warm southern climates, where a tranquil existence is led, obesity is common, and again in the northern regions, among the Icelanders and Eskimos, it is also prevalent, but this may be due, at least in part, to the large quantities of foods rich in oil that are consumed in these frigid regions. The Dutch, Germans and Jews seem prone to this condition, and it is very frequently seen among the colored race. Sedentary life, lack of physical exertion and sanguine temperament are also predisposing factors.

Among the exciting causes are pituitary insufficiency, cretinism and myxedema. Puberty, the menopause, thyroidectomy, castration and conditions in which the equilibrium of the system of glands of internal secretion is profoundly disturbed, over-indulgence in eating or drinking and the selection of foods rich in hydrocarbons and carbohydrates, foods rich in fat, sweets, starches and malt liquors are conducive to obesity. Alcohol, while not in itself a fat producer, conserves body waste and favors the storing of energy and the prevention of proper oxidation of the tissues, and thus favors the production of obesity. Proteids do not form fat themselves, but are productive of energy and prevent tissue waste.

The fat is not only excessive where its normal distribution is marked, but the thoracic and abdominal viscera are surrounded by great layers of adipose tissue, and their normal function is impeded by this crowding. The fat infiltrates in between the parenchymatous tissue of the heart, kidneys, liver and other viscera, and eventually fatty degeneration of the essential cellular structure frequently takes place. The blood is increased in specific gravity, and the hemoglobin may also be above normal. The intermuscular tissue is hypertrophied and the heart and arteries show dilatation and tendency toward sclerosis and atheroma. The veins have a tendency to become varicose. Passive congestion or edema of the lungs due to cardiac weakness occurs in advanced cases. The liver and kidneys may undergo fatty degeneration, and finally sclerosis. The stomach is often dilated, especially in those who indulge in excessive eating. Gastro-intestinal disturbances are often present, and the involvement of the sexual organs is shown by underdevelopment and impotency in the male and sexual infantilism and amenorrhea in the female. Displacement of the uterus, due to overcrowding, is not an infrequent complication. Amenorrhea may also be present in cases in which the organs of generation are properly developed, but their function is impeded by the excessive fat, or anemia may be a symptom. It is most frequent between thirty and forty years of age.

Symptoms.

The symptoms, besides a general feeling of bulkiness and inability for quick action, are shortness of breath, difficulty in respiration, palpitation on slight exertion, tendency to fatigue easily, lack of endurance for prolonged either mental or physical exertion. Dizziness, chlorosis in the female, neurovascular disturbances, such as flashes of heat, flushing of the face, profuse perspiration. The nervous condition may range all the way from irritability to apathy and indifference. The muscles may be flabby or firm and well developed. Tachycardia or bradycardia may be present. The latter is a distinctly alarming feature, as it indicates cardiac weakness. Bronchial catarrh with a cough due to passive congestion is also a sign of cardiac weakness. The appetite may be excessive, or, on the contrary, distinctly below par; not all of these cases are large eaters. Insomnia may be a troublesome feature, but the contrary, a distinct tendency to hepitude or sleepiness is the rule. Lithemic and uric acid conditions are often the cause of great discomfort, manifesting themselves by gout or rheumatism. Some of the complications are hernia, cardiac asthma, cerebral hemorrhage, arterio-sclerosis, as stated above, albuminuria, glycosuria, and the terminal stages may be coma and death.

Treatment.

The treatment can be divided into prophylaxis, diet, exercise, massage, hydrotherapy and medicinal or organotherapy.

Under prophylaxis the two chief considerations are abstinence from indulgence in over-eating, especially of articles of diet known to be rich in sugar, starches, and fats, and in alcoholic beverages. Reasonable exercise, especially in the open air and avoidance of a sedentary life are necessary. The diet is undoubtedly of paramount importance in the treatment of this disease. While there have been numerous systems of diet formulated by different authors, as for instance by Epstein, Oertel, Banting, etc., it must be understood in the beginning that no set rules can be laid down which will be applicable to all cases. The diet must be selected according to the individual peculiarities, circumstances and environment in each case. It must be remembered that it is not only the individual constituents of the dietary that produce obesity, but the combination in which they are taken is of great importance. It is a well established fact that potatoes and other carbohydrates are conducive to obesity. Yet one of the well-known methods of treatment in Germany is what is called the potato kur, which consists in living exclusively on potatoes. By this method considerable reduction of weight has been obtained.

It is the author's custom to eliminate alcohol absolutely and to reduce the use of sweets, starches and fats to a minimum, being governed always by the effect upon the individual. The use of water must be curtailed, and all foods rich in fat and oil should be abstained from.

Exercise must be prescribed with great care. Over-exercise, especially in cases where there is cardiac involvement, may produce serious or even fatal results. Always being governed by the condition of the patient, it is wise to prescribe out of door exercise as much as possible, as that in particular promotes oxidation and elimination. Walking, golf playing, horseback riding and other non-violent exercises should be given preference. In the house calisthenics, bending, rolling and movements to reduce the size of local parts can be advised, as indicated in the individual case, but resistance exercises are especially to be avoided, as they throw an extra tax upon the cardio-vascular system.

Massage is a useful adjuvant and when intelligently administered by a well trained person very marked results are obtainable. The form, in fact, can be molded almost at will. Bathing is an extremely useful remedial agent, as it promotes elimination, stimulates the emunctories and promotes oxidation. Cold baths with a brisk rub down with a Turkish towel taken in the morning are of decided advantage. Turkish baths are also advisable in selected cases, but great care must be taken not to administer them where there is any cardiac or vascular weakness.

Among the medicinal agents purgatives and phytolacca are most usually employed, but again caution must be observed, as there is danger of producing chronic gastro-intestinal trouble. The use of alkalies given an hour after meals produces saponification of the fats, and they are eliminated without being absorbed.

Organotherapy is useful, and thyroid in different forms has been most extensively employed. This promotes oxidation, and very striking results have been obtained. It is, however, a powerful agent and dangerous when promiscuously used, and should only be employed under the observation of a physician. In cases of cardiac involvement it must be avoided. Adonis vernalis is a useful agent when the heart is weak. Self-drugging should be discouraged. In cases of infantilism pituitary products have been used with advantage.

By intelligent treatment the weight of these patients can be reduced sometimes as rapidly as a pound a day not only without harm to the patient, but with a distinct advantage. Patients who considered themselves in the best of health before taking treatment because they were able to eat, drink and sleep well are astonished at the improvement in their physical and mental condition. They become buoyant and their efficiency very much increased.

The results which the author has obtained in re-establishing the equilibrium of the ductless sexual gland system by the use of the polyglandular solution described in a previous chapter are appended herewith.

Case No. 1. February 15, 1911. Female, age 45, single. Family history. Father died of tuberculosis, mother of diabetes. Otherwise negative. Previous history. Measles and scarlet fever. No other definite sickness until six years ago, when she had an attack of acute articular rheumatism. Was always inclined to be nervous. Menstruated at 12 years. Was regular up to 25th year, when she became rather obese, weighing 175 pounds, and menses became somewhat irregular and was accompanied by marked nervous explosions. Has had attacks of rheumatism for various periods for the past six years. Has had a very severe attack within the last six months, confining her to bed for eight weeks. Present condition. Amenorrhea, nervous excitement and given to unreasonable fits of anger. Examination. Height 5 feet 3 inches, weight 250 pounds. Very pendulous abdomen, flesh lying in folds. Thyroid impalpable. Signs of pituitary insufficiency. Pale skin and decreased temperature 98 degrees F.; blood pressure 94 m.m. Has not menstruated at all for three months and very irregular for the past five years. Bowels constipated, appetite capricious. Sleep variable. Treatment. Injections three times weekly for four months. Lost 8 pounds in weight in first month and menses commenced; 12 pounds second month and 10 pounds third month. Now menstruating regularly and nervous symptoms very much improved. Temperature normal and appearance of woman in perfect health. Patient is able to get about and attend to her duties with comfort.

Case No. 2 . May 3, 1909. Female, age 41. Family history good. Previous history good; never sick. Present condition. Digestion fairly good; bowels fair; sleeps well; nerves good. Menses regular; profuse leucorrhea. Gets out of breath upon slightest exertion. Examination. Height 5 feet 4 inches; weight 210 pounds. Florid complexion, immense abdomen and hips. Waist 36½ inches; bust 44 inches, hips 46 inches, leg 26½ inches, calf 16½ inches, arm 14½ inches. Treatment. Obesity diet, exercise. Injection of polyglandular solution three times weekly. May 20th. Weight 191½ pounds. Feels well, breathing much better. June 4th. Lost 6½ pounds more. June 10th. Waist 31 inches, bust 38 inches, hips 42 inches, leg 24 inches, calf 15½ inches, arm 13 inches. Lost 4 pounds more. June 18th. Feeling bright and able to move about with great ease. Has not been weighed or measured since last visit. June 26th. Waist 29½ inches, bust 38½ inches, hips 42 inches, leg 24 inches, calf 15 inches, arm 13 inches. August 20th. Waist 26 inches, bust 38 inches, hips 40½ inches, leg 22½ inches, calf 15 inches, arm 12 inches. Weight 165 pounds. Able to walk and dance and perform ordinary exercise without slightest inconvenience.

See also Case No. 6 in chapter on Neurasthenia.

CONCLUSION.

In our present state of knowledge there are many diseases or abnormal conditions which are manifested by clinical syndromes which are very mysterious and inexplicable. If the pathologist of the future will pay more attention at autopsy to the condition of the glands of internal secretion, our knowledge will undoubtedly be increased; but this is a subject that goes deeper and is more abstruse than that covered by the pathologist, as we usually understand his work either gross or microscopic. It is not by the study of mere anatomical or histological change in these glands that we may look for the real secrets that are responsible for these syndromes, but to the chemical pathologist of the future who will specialize on studying the delicate changes and fine gradations in composition which take place in the blood. When we are able to speak with familiarity and under-standing of the chemistry of these internal secretions as they exist normally, and to detect and remedy deviations from this normal chemistry of life, then we will indeed have reached the goal to which the study of internal secretions is leading.

In a recent article by an English writer he has aptly stated that the internal secretions are to physiology what radium is to chemistry.

Thus it will be seen that the glands of internal secretion which are so intimately associated with the most essential vital processes may well be called the "glands of life."

GLOSSARY.

Ablate—To remove, especially by cutting.

Acral—The extremities.

Adipose—Of a fatty nature.

Adrenal—1. Near the kidney; 2. A suprarenal capsule.

Adynamia—Lack of vital power.

Amenorrhea—Absence or abnormal stoppage of the menses.

Anabolic—Pertaining to constructive metabolism.

Anaphrodisia—Absence or loss of sexual desire.

Anesthesia—Loss of feeling or sensation.

Anorexia—Loss of appetite for food.

Anus—Distal end and outlet of the rectum.

Arhythmia—Lack of rhythm in the beating of the heart.

Arteriole—Any minute arterial branch.

Arterio-sclerosis—Hardening of the arterial walls.

Aseptic—Free from material produced by, or due to putrefaction or infection.

Aspermia—Deficient secretion of semen.

Asthenia—Debility; lack or loss of strength.

Asthenic—Characterized by debility.

Asthenopia—Weakness and speedy tiring of visual organs.

Atheroma—Degeneration of the coats of blood-vessels.

Athyria—Deficiency of thyroid secretion.

Atony—Absence or lack of normal tone.

Balneotherapy—Treatment of disease with baths.

Bitemporal—Pertaining to both temples.

Bradycardia—Abnormal slowness of the pulse.

Cachexia—Depraved state of nutrition.

Calories—Units of food value.

Calorifactive—Pertaining to calories.

Carbohydrates—Sugars and starches.

Carcinoma—Malignant tumor made up of connective tissue enclosing epithelial cells.

Castration—The removal of the testicles or ovaries.

Catabolism—Passage from a higher to a lower form.

Catamenial—Pertaining to the menses.

Cecum—The dilated intestinal pouch, into which open the ilium, the colon, and the appendix vermiformis.

Cerebro-spinal axis—The central nervous system.

Cells of Leydig—Mucus cells which do not pour their secretion out over the surface of the epithelium.

Chlorosis—Anemia of young women about the time of puberty.

Chorea—St. Vitus dance.

Chorioretinitis—Inflammation of the choroid and retina.

Choroiditis—Inflammation of the choroid, a vascular coat of the eye, between the sclerotic and retina.

Chromophilic cells—Cells that take a stain.

Chyme—Food which has undergone gastric digestion.

Cirrhosis—A hardening caused by interstitial inflammation of an organ.

Cirrhotic—Of the nature of cirrhosis.

Coefficient—A figure put before a chemic formula to indicate how many times the formula is to be multiplied.

Colloid—Resembling glue.

Commisure—Tissue linking corresponding right and left parts of brain or cord.

Cortical—Pertaining to the outer layers of an organ as distinguished from its inner substance.

Crepitation—Grating of the ends of bones.

Cyanosis—Blueness of skin.

Cystitis—Inflammation of the bladder.

Cytoplasm—Protoplasm of the cell body.

Dementia—Abnormal mental condition.

Dysmenorrhea—Painful menstruation.

Dyspnea—Labored or painful breathing.

Dystrophy—Faulty nutrition or function.

Edematous—Pertaining to, or affected by, a swelling, due to effusion into connective tissue.

Emasculation—Removal of the testicles.

Emunctories—The excretory organs.

Endemic—Always present in a certain district.

Enteroptosis—A sinking down or falling of the intestines.

Epiphyseal—Pertaining to that portion of a long bone from which growth takes place.

Epistaxis—Nose-bleed.

Erythrocyte—A red blood-corpuscle.

Etiology—Scientific view of causes of disease.

Euthanasia—Easy or painless death.

Exanthematous—Characterized by an eruption or rash.

Feces—Excrement discharged from the bowels.

Festination—A gait in which the patient takes quicker and quicker steps.

Fetus—The unborn child after end of the third month.

Fibrinogen—A globulin from which fibrin is mainly derived.

Flatus—Gas or air in the stomach or intestine.

Fontanelles—Any one of the unossified spots on the cranium of a young infant.

Friable—Broken easily into small pieces.

Fundus—The base or part remotest from the mouth of a hollow organ.

Gastroptosis—Abnormal depression of stomach.

Gluteal—Pertaining to the buttocks.

Glycosuria—Sugar in the urine in an abnormally high proportion.

Gonorrhea—Contagious catarrhal inflammation of the genital mucous membrane.

Hemianopsia—Blindness of one-half field of vision in one or both eyes.

Hemoglobin—Coloring matter of red blood-corpuscles.

Hemoptysis—Spitting of blood.

Hepitude—Heaviness, dullness.

Herpes zoster—Shingles.

Histogenesis—Formation of tissues.

Histology—The science of the minute structure and composition of tissues.
Hydrocarbons—Fats.
Hydrocephalus—Water on the brain.
Hydroscopic—Pertaining to an instrument for detecting the presence of water.
Hyperchlorhydria—Excess of hydrochloric acid in the gastric juice.
Hyperemia—Excess of blood in any part of the body.
Hyperesthesia—Excessive sensitiveness of the skin.
Hyperplasia—Abnormal multiplication of tissue elements.
Hypertrichosis—Excessive hairiness.
Hypophysis—Any process or out-growth. H. Cerebri, the pituitary body.
Hypostatic—Pertaining to the formation of a deposit, especially a settling of blood from feeble blood-current.
Hypothyroid—Deficient action of the thyroid gland.
Iliac fossa—Wide depression on the ilium.
Ilium—The flank; 2. flat upper part of hip-bone.
Indicanuria—Excessive amount of indican in the urine.
Infragenitalism—Underdevelopment of the genital organs.
Intrasomatically—Within the body.
In vitro—Within a glass; observable in a test tube.
Karyolysis—Morbid destruction of a cell nucleus.
Kyphotic—Affected with hunch-back.

Lavage—A washing out or irrigation.

Leukocyte—Any colorless ameboid cell-mass, such as a white blood-corpuscle.

Lordosis—Curvature of spinal column with forward convexity.

Masturbation—Self-pollution.

Megalokaryocytes—The giant cells of the bone marrow.

Meninges—The membranes of the brain and cord.

Menorrhagia—Immoderate flow of menses.

Mesenteric—Pertaining to the fold of the peritoneum which attaches the intestine to the posterior abdominal wall.

Metabolism—Change in living organism induced by the action of cells.

Metrorrhagia—Uterine hemorrhage.

Micturition—The passage of urine.

Migraine—Periodic sick headaches.

Mitral-stenosis—Contraction of valve between left auricle and left ventricle of the heart.

Mucosa—Mucous-membrane.

Myalgia—Muscular pain.

Mydriasis—Great dilatation of the pupil.

Myocardium—The muscular substance of the heart.

Necropsies—Post-mortem examinations.

Nephritis—Inflammation of the kidney.

Neurosis—A nervous disease, especially a functional disease.

Nucleated—Having a nucleus or nuclei.

Nucleus—A spheroid body within a cell; the core or centre of a cell.

Noguchi test—A modification of the Wassermann reaction.

Orchitis—Inflammation of the testicles.

Osmosis—The passage of a fluid through a membrane.

Osteomalacia—Softening of bones.

Parenchyma—The essential or functional elements of an organ as distinguished from its stroma or framework.

Paresis—Slight or incomplete paralysis.

Paresthesia—Morbid sensation.

Pathognomonic—Pointing out the nature of a disease or illness.

Pathological—Pertaining to the sum of what is known regarding diseases.

Pemphigus—A disease marked by formation of cutaneous vesicles, which after absorption leave pigmented spots.

Penis—Male organ of sexual congress.

Perineum—Space or area between anus and genitalia.

Peripheral—Pertaining to the outward part or surface.

Peristalsis—Wave-like contraction of the stomach and intestines.

Phagocytic—Pertaining to any cells that destroy micro-organisms, or harmful cells.

Pharmacons—Medicines.

Phosphaturia—Excess of phosphates in the urine.

Plexus—A network or tangle, chiefly of veins or nerves.
Polydipsia—Extreme or abnormal thirst.
Polyphagia—Excessive feeding.
Polyuria—Excessive amount of urine.
Prophylaxis—Prevention.
Prostate gland—A gland surrounding the neck of the bladder and urethra in the male.
Protoplasm—A granular material, the essential constituent of the living cell.
Psychosis—Any mental disease.
Puerperium—The period or state of confinement.
Purin—Any one of a group of chemical compounds with the nucleus $C_5\ N_4$, including uric acid, xanthin, guanin, etc.
Pyloric stenosis—Contraction or narrowing of the opening from the stomach to the small intestine.
Renal—Pertaining to the kidney.
Sacculation—The state of containing small sacs.
Sarcoma—A tumor made up of a substance like the embryonic connective tissue; often highly malignant.
Scibila—Hard, small, fecal masses.
Sclerosis—Hardening due to chronic inflammation.
Skatol—A crystalline substance $C9\ H9\ N$ from feces.
Somatic—Pertaining to the body.
Spastic—Of the nature, or characterized by, spasms.
Spayed—Deprived of the ovaries or testicles.
Spermatogenesis—The development or production of spermatozoa.

Spermatozoön—The male generative cell, consisting of a head or nucleus, and a flagellum or tail.

Sphincter—A ring-like muscle which closes a natural orifice.

Splanchnic—Of, or pertaining to, the viscera.

Striated—Having streaks or stripes.

Stroma—Tissue which forms the ground substance or framework of an organ.

Syndrome—Same as complex of symptoms.

Tachycardia—Excessive rapidity of the heart's action.

Therapeutic—Pertaining to the scientific account of the treatment of disease.

Thyroidectomy—Surgical removal of the thyroid.

Toxemia—Poisoning by toxins produced in the body cells or by the influence of micro-organisms.

Toxin—Any poisonous albumin or base of bacterial origin.

Trachea—Wind pipe.

Traumatism—Condition of system resulting from an injury or wound.

T. B.—Tuberculosis.

Ureter—One of the tubes through which the urine goes from the kidney to the bladder.

Urethra—The passage through which urine is discharged from the bladder.

Vacuole—A space or cavity formed in the protoplasm of a cell.

Vacuolation—The process of forming vacuoles.

Vascular—Pertaining to, or full of vessels.

Vasomotor—Pertaining to the contraction or dilatation of a vessel.

Venery—Sexual indulgence.

Vesicle—A small blister or bladder.

Vesicular—Pertaining to, or of the nature of a vesicle.

Viscid—Adhesive; sticky.

Vis Medicatrix Naturae—The healing power of unaided nature.

Visceral—Pertaining to any large interior organ in any of the four great bodily cavities, especially those in the abdomen.

Visceroptosis—Downward displacement of the abdominal organs.

Wassermann's Test—A reaction applied to the diagnosis of syphilis.